ADEM
ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

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#26944

August 16, 1994

Mr. Brian Farrier
EPA CERCLA PA/SI Regional Project Officer
Site Investigation Support Section
Waste Management Division
US. EPA Region IV
345 Courtland Street
Atlanta, GA 30365

RE: Site Investigation Prioritization / Degussa
Mobile County, Alabama -- EPA ID # ALD075045575

Dear Mr. Farrier:

Enclosed please find a copy of the SIP narrative, references, and SI Worksheet for the Degussa Corporation site located in Mobile county. If you have any questions, please call me at 205/260-2712.

Sincerely,

Clayton N. Scott
Compliance Section
Field Operations

cc: Jymalyn Redmond

Site Investigation Prioritization
Degussa Corporation

Mobile County, Alabama
EPA ID # ALD075045575

Prepared by

Alabama Department of Environmental Management
August 1994

Site Investigation Prioritization
Degussa Corporation
Mobile County, Alabama
EPA ID # ALD075045575

August 1994

Reviewed by:_____

Site Investigation Prioritization
Degussa Corporation
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Site Investigation Prioritization
Degussa Corporation
Mobile County, Alabama
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1.0 INTRODUCTION

Under authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA) the Alabama Department of Environmental Management (ADEM), Field Operations Division, conducted a Site Investigation Prioritization (SIP) of the Degussa Corporation site.

The purpose of the investigation was to assess the threat this site may pose to human health and to the environment. Existing regulatory files concerning this site, including any past CERCLA reports were evaluated utilizing the Hazard Ranking System (HRS).

2.0 SITE DESCRIPTION

Degussa is an active regulated site (RCRA, CWA and CAA) at this writing doing business as the Degussa Corporation. The facility is located on about 500 acres in the Theodore Industrial Park, about 15 miles south of Mobile Alabama. Degussa generates numerous intermediaries to produce the final "shipped" products, with the primary being: methionine, H_2O_2 and fumed silica. [1,2,3]

2.1 Location

The site is located in Mobile County south of Theodore, section 23 of Township 6 South, Range 2 West. at a the approximate coordinates: latitude 30° 31' 23" and longitude 88° 08' 23".[3]

Generally, the setting is industrial with several other large chemical or manufacturing facilities within 3 miles of Degussa. Suburban areas associated with Theodore/Mobile exist in the 1 mile to 4 mile radii, primarily toward the north west. Other inhabited areas include the community of South Orchard, located 3 to 4 miles south of the site. Headwaters of Dykes Creek and associated lowlands are located adjacent to the south side of the site and the Alabama State

Docks dredge spoil area are located on adjacent property to the west of the facility. [2,3]

2.2 Historical/Ownership

The facility was originally built in the early 1970s for the Degussa Corporation and has been operating as Degussa Corporation since construction completion in early 1974. [1,2]

2.3 Waste/Source Characterization

Production of fumed silica (inert fibrous fillers), methionine and hydrogen peroxide are the primary products, as well as numerous intermediaries from numerous feedstocks. [2,4]

The facility is not a TSD nor are there any closed impoundment on-site. The only "waste/source" identification included furnace ashes that were stored in crates on the north side of the property, on 2-3 foot thick clay pad construction crew parking lots in the late 1970s. Some of the crates deteriorated resulting in spillage of the ash material, at which time Degussa reportedly bermed the lot to preclude runoff. Waste material along with some of the graded clay was subsequently disposed of at an off site landfill.[1,2]

3.0 GROUND WATER PATHWAY

Ground water monitoring occurred in the past with concern over elevated "total dissolved solids" and chlorides, however, contaminant levels have diminished to the point of no longer being a concern. The surficial aquifer or ground water is typically 10 to 20 feet below the surface at the facility. [5]

3.1 Hydrogeology

The site is located in the Alluvial-Deltaic Plains physiographic section. The major underlying formation is the Miocence Series, undifferentiated, which is composed of gray, orange and red fine to course grained sand, red ferruginous sandstone, and sandy silty clay. The Miocene series, undifferentiated is about 2000 feet thick.. The main production zone in the immediate vicinity of the site is located in the Miocene/Pliocene aquifer in the sand units located near the base of the aquifer. The top of the aquifer generally occurs 125 to 150 feet below the land surface, with individual sand beds being 50 to 100 feet thick. The regional Groundwater flow is south-southwesterly, the same direction as regional dip. Groundwater in

this aquifer is recharged by precipitation in areas west and north of the facility. The water table aquifer may discharge to local streams and form swamps in topographic lows, such as near Dykes Creek to the south. Sand and gravel units are generally too thin around the facility for significant aquifer usage. However, small quantities of good quality water are available for domestic use.[1,6]

3.2 Targets -- Ground Water

Within four miles of the site, are several industrial water supply wells and one public water supply well. The public well belongs to the Mobile County Water and is about three miles north of the site. This well is 148 feet deep and screened in the alluvium. Mobile County Water Works services 3,920 connections (2.5 persons/connection based on county average) or about 9,800 individuals. [7,8]

4.0 SURFACE WATER PATHWAY

4.1 Hydrology

Facility/site drainage for the vast majority of the facility is southward into headwaters of Dykes Creek with additional drainage northwestward into wetlands. Additionally, an NPDES outfall from a biological treatment unit on site is discharged north of the site in the Theodore Industrial Canal. During the reconnaissance, Dykes Creek had no flow south southeast of the facility at Laurendine Road, and is therefore considered an intermittent stream. Mobile Bay lies approximately 2.5 miles east of the Degussa facility. The facility is located in the Coastal Lowlands District and the Coastal Plain physiographic province above the 100 year flood plain. The area is best described as flat to gently undulating plains which are locally swampy. Topographic relief on the facility varies from approximately 30 to 40 feet above mean sea level. [1,2]

The climate is described as subtropical, with long, hot, humid summers showing relatively stable temperatures. The coldest months are on average December through February, when there are frequent shifts between warm, moist Gulf air and cool, dry continental air masses. Precipitation averages about 65 inches per year. July through September are the wettest months with March also averaging 6.5 inches of rainfall. The driest months being October and November. The maximum daily rainfall recorded between 1951 and 1984 was 13.4 inches in April 1955.[1,6]

Approximately 100 acres of low lands or wetlands are found associated with Dykes Creek, as head waters south of the site which flows southward about 3 miles until confluence with the Fowl River. [3]

4.2 Targets -- Surface Water

Endangered species that are known to exist or range in the area include the: Wood Stork, Alabama Sturgeon, Gulf Sturgeon, Alabama Red-Bellied Turtle and the Bald Eagle. [3] Of particular concern or habitat specific, within a four mile radius of the site are the Alabama Red-Bellied Turtle and the "Threatened" Gopher Tortoise.[9,10]

5.0 SOIL EXPOSURE AND AIR PATHWAYS

5.1 Site Conditions

An active major industry in the area, Degussa employs about 700 - 800 individuals.

5.2 Targets -- Soil Exposure & Air

No on site disposal occurs at the Degussa facility and therefore is considered minimal or non-existent. The air pathway appears to pose no threat. Each production unit on site has a wastestream manager(s). [2]

6.0 Summary and Conclusions

Degussa is an active regulated facility that exhibits compliance and or willingness to comply with governing regulations. This site is recommended for consideration as SEA.

REFERENCES

1.	Preliminary Assessment, August 1984	Appendix A
2.	Telephone conversation writer with Mr. Gene Sheppard	
3.	7.5 minute Topographic Maps with buffer zones	Appendix B
4.	SARA Title 313 File excerpts	
5.	Ground water files review	
6.	Geology excerpts from adjacent site "Kay Fries" July 1994	
7.	County Population/Statistics	
8.	FRDS Database of Public Drinking Water Systems -- area excerpts	
9	U.S. Fish and Wildlife review of "Endangered Species"	
10.	"Vertebrate Animals of Alabama in Need of Special Attention" excerpts	

Preliminary Assessment, August 1984

Appendix A

Conversation: Writer C. Scott with Degussa's Gene Sheppard 205 443-4287
8/11/94

Re:
1. State Docks property and usage by Degussa never occured
2. Ash and affected soil was cleaned up and removed
   No storage or treatment of waste occurs on site
3. Products review in brief
4. NPDES discharge
5. Size of facility
6. Number of employees

7.5 minute Topographic Maps with buffer zones

Appendix B

Degussa

Degussa
Corporation

TRI Facility ID Number: 36590 DGSSC DEGUS

JUN 1991
RECEIVED
ADEM-FO
MONTGOMERY

June 26, 1991

E. John Williford, Chief of Operations
Alabama Emergency Response Commission
Alabama Department of Environmental
Management
1751 Conressman W.L. Dickinson Drive
Montgomery, AL 36109

Dear Sirs:

Enclosed please find our Toxic Chemical Release Inventory Reporting forms as required by SARA Title III Section 313 for the calendar year 1990.

CHEMICAL NAME	CAS NUMBER
CARBON TETRACHLORIDE	000056-23-5
1,2-DICHLOROETHANE	000107-06-2
ACETALDEHYDE	000075-07-0
ACETONE	000067-64-1
AMMONIA	007664-41-7
AMMONIUM SULFATE (SOLUTION)	007783-20-2
CHLORINE	007782-50-5
ETHYLENE GLYCOL	000107-21-1
FORMALDEHYDE	000050-00-0
HYDROCHLORIC ACID	007647-01-0
HYDROGEN CYANIDE	000074-90-8
METHANOL	000067-56-1
NITRIC ACID	007697-37-2
PHOSPHORIC ACID	007664-38-2
SULFURIC ACID	007664-93-9

If you have any questions concerning this submittal, please advise.

Sincerely,

Bill Irwin
Environmental Manager

BI/lh

Enclose

JUN 1991
RECEIVED
ADEM-FO
MONTGOMERY

reference 4

Mobile CO.

Degussa

Degussa
Corporation

February 25, 1994

Mr. John Williford
Alabama Department of Environmental Management
1751 Congressman W. L. Dickinson Drive
Montgomery, Alabama 36130

RE: Section 312 of SARA Title III

Dear Mr. Williford:

To fulfill reporting requirements for 1993 under Section 312 of SARA Title III, Degussa Corporation is submitting a Tier II report for your use in local emergency planning. This report contains information on chemicals and their locations within our Theodore, Alabama plant site. Enclosed also is an overall plot plan and building description codes.

The Tier II information has been compiled for the entire facility at our Theodore plant site. To better serve you in any emergency in which your department might be involved, a break down of the different areas is listed below:

1. Plant Entrance
2. E300 - Engineering, Field Maintenance & Warehouse
3. F300 - Maintenance Area
4. G300 - Chemical Waste Storage
5. B400 - Stores, Receiving, Maintenance Shops
6. C400 - Hydrogen Peroxide Unit
7. D400 - HCN Unit
8. E400 - CYC Unit
9. F400 - Aerosil/Siltet Unit
10. G400 - Trailer Complex
11. B500 - Warehouse
12. C500 - Substation, Engineering
13. D500 - ISO Container Yard
14. E500 - Methionine Unit
15. F500 - Utilities/Formaldehyde Unit
16. G500 - Ultraform Unit
17. D600 - Bio Plant
18. E600 - Carbon Hopper Rain Cover
19. F600 - Utilities/Formaldehyde Warehouse
20. H500 - Acrolein Unit

If you have any questions on our SARA Title III reporting , please feel free to contact me at 443-4000, extension 2763.

Sincerely,

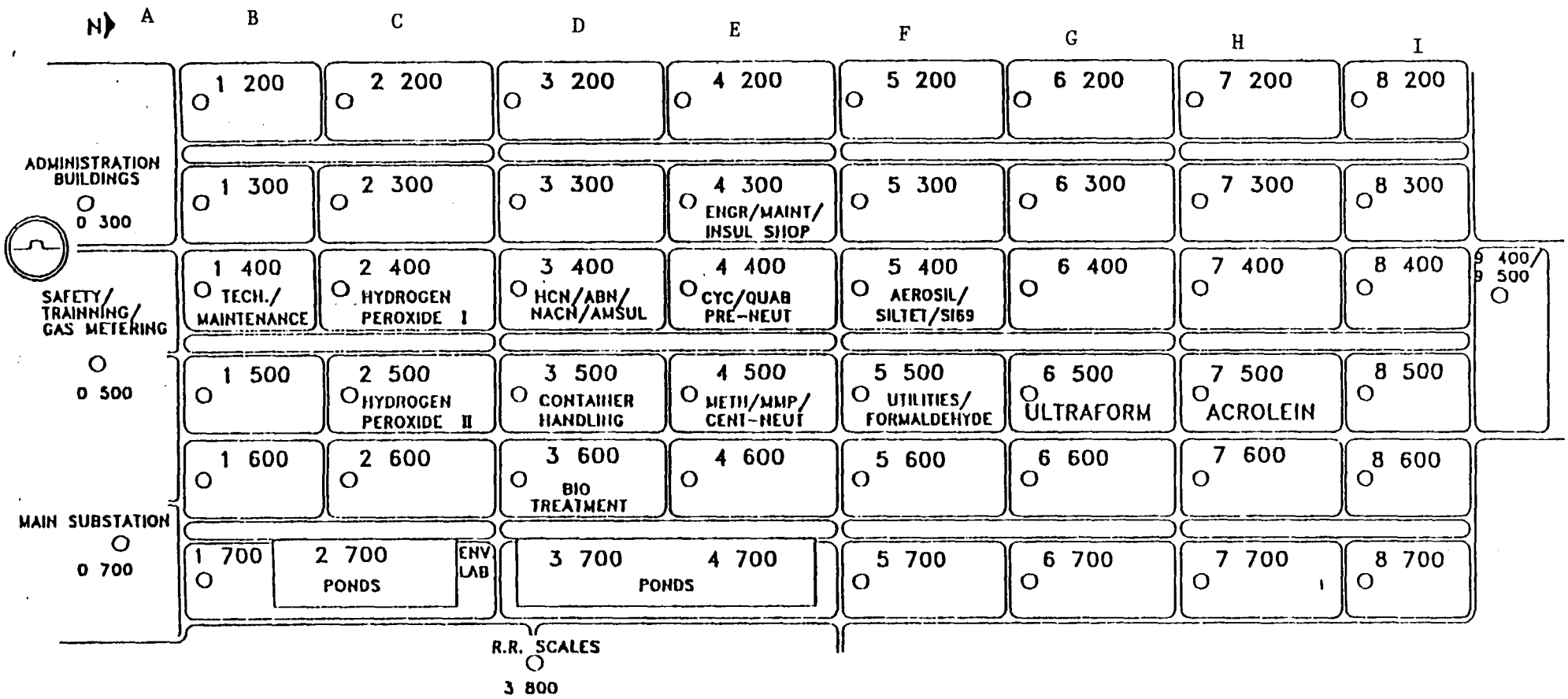
Mercedes Hernandez/ce
Mercedes Hernandez
Environmental Compliance Manager

Enclosures

cc: Dr. Ploetz
G. Wharton

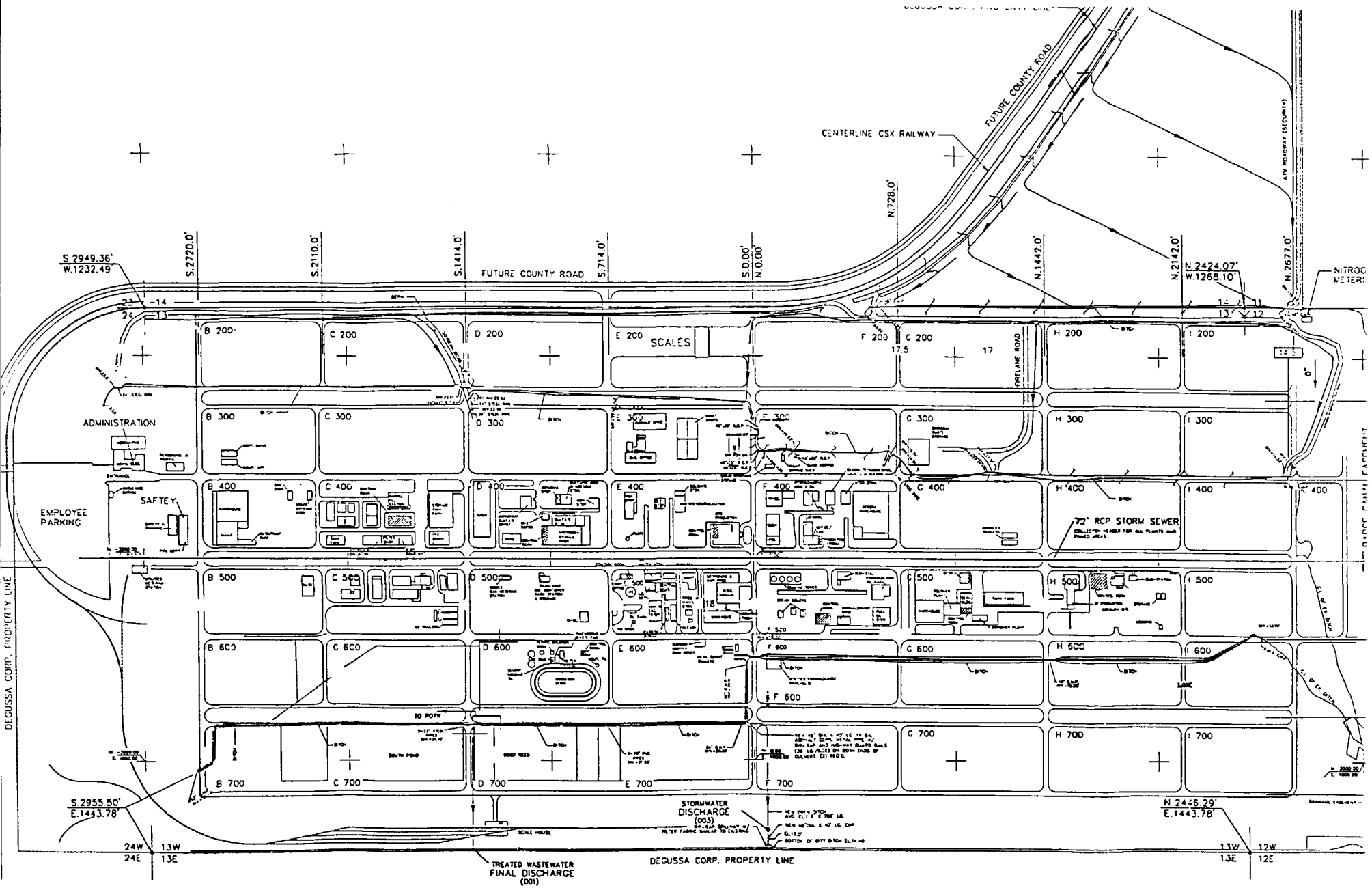
EMERGENCY ALARM

PLANT BLOCK LOCATION



BUILDING CODES

Concentration	C-402
Oxidation/Adsorption	C-403
Storage Tank Farm	C-408
Storage Solid Material	C-409
Filter Workshop	C-410
C410 Expansion	C-410E
Hydrogenation Regeneration	C-411
Tank Farm	C-412
Concentration	C-502
Oxidation/Adsorption	C-503
Storage Solid Material	C-509
Hydrogenation Regeneration	C-511
Amsul Plant	D-424
Ammonia Storage	D-426
Sulfuric Acid	D-427
Acetone Storage	D-428
ABN Storage	D-429
Phosphoric Drums	D-454
Amsul Storage	D-456
Ammonia Vaporization	D-455
HCN Outside Process	D-457
ABN Production	D-458
CYC Plant	E-488
HCl Preneutralization	E-416
Quab Plant	E-418
Quab Plant	E-419
Quab Plant	E-428
HCN Storage	E-431
HCN Storage	E-433
Chlorine Storage	E-434
Quab Plant	E-438
Quab Plant	E-448
West MCC	E-455
CYC Warehouse	E-496
Methionine & MMP Production	E-537
Methionine Warehouse	E-588
Storage Building	G-515
Tank FArm	G-547
Warehouse	G-552
Polymer Plant	G-563
Monomer Plant	G-585



PROPERTY PLOT PLAN LOCATION AND ELEVATIONS FOR OPEN FACE DRAINAGE DITCHES 1"=250'

0 250 500

August 11, 1994

A review of the ground water files revealed that an ordered action by ADEM required monitoring of ground water chlorides and total dissolved solids from the lagoon /pond area on the East side of the facility. The past release is of little concern as of this writing.

The facility is generally on slightly elevated ground bounded by surface water bodies to the east and west. Muddy Creek lies approximately 0.75 miles west of the facility and flows southward. Dykes Creek lies within 0.25 miles of the facility and flows south-southeastward. The headwaters for Dykes Creek appear to originate in a swamp located east-northeast of the facility. Both creeks discharge into Fowl River, three miles south of the facility. Mobile Bay lies approximately 2.5 to 3 miles east of Kay-Fries (Reference 94).

Several soil series are present on the facility, including Benndale, Escambia, Grady, Heidel, Malbis, Notcher, Poarch, and Smithton. These soils generally consist of sandy loam or loam which are low in organic content and natural fertility. Soils on the more elevated areas are generally moderately-well to well drained, while soils in the low-lying areas are generally poorly drained due to the higher percentage of fine-grained sediment in the soil. All soils are generally acidic, with a pH of 4.5 to 5.5. Seasonal water tables in winter and spring are at depths of four feet or less. Most soils have a moderate water retention (Reference 159). The areal extent of the soil types at the facility site in 1980 is shown in Figure II-10, prior to facility construction. Soil from the west side of the facility was reportedly moved to fill low areas near Dykes Creek before the Surface Impoundments were constructed. Thus, Benndale sandy loam was probably placed on

reference 6

Legend

	Water
4,5	Bama Sandy loam (0-2%, 2%-5% slopes)
9,1	Benndale sandy loam (0.2%, 2%-5% slopes)
13	Dorovan-Bibb association (0-1% slopes)
16	Escambia sandy loam (0.2% slopes)
19	Grady loam (0-1% slopes)
20	Harleston sandy loam (0-2% slopes)
22, 23	Heidel sandy loam (0-2%, 2%-5% slopes)
26	Izagora-Bethera association (gently undulating)
27	Johnston-Pamlico association (0-1% slopes)
30,31	Malbis sandy loam (0.2%, 2%-5% slopes)
33	Notcher sandy loam (2-5% slopes)
36	Pactolus loamy sand (0-2% slopes)
37	Pamlico-Bibb complex (0-1% slopes)
39	Poarch sandy loam (0-2% slopes)
48	Saucier sandy loam (0-2% slopes)
45	Smithton sandy loam (0-1% slopes)
50	Troup loamy sand (0-5% slopes)

Reference 159

top of Smithton sandy loam in the northeastern section of the facility. For more detail on soil characteristics at the site, see Appendix F.

Kay-Fries is located in the Flood Plain, Terrace, and Beach subprovince of the Coastal Plain physiographic province, in the onshore extension of the Gulf Coast geosyncline and on the east flank of the Mississippi Embayment (Figure II-11). The key geologic formation underlying the facility are undifferentiated Pleistocene and Holocene clastics, the Pliocene Citronelle Formation, and undifferentiated Miocene Series sediments. These geologic units, with their geologic and hydrologic characteristics,are shown in Figure II-12.

Unconsolidated Miocene sediments, which are laterally and vertically discontinuous, consist primarily of very-fine to coarse-grained sands, which are locally conglomerate and contain minor cross-bedding. A sandy, silty clay is also present in the upper section, while the lower half of the Miocene series in Mobile County consists of limestone and marl. Miocene sediments in the Kay-Fries area are 1900 to 2200 feet thick and dip approximately 10 to 45 feet per mile (References 25, 94).

The overlying Citronelle Formation has a variable lithology, both vertically and horizontally, consisting of fine- to coarse-grained sandstone, gravelly sand, and lenses of sandy clay and clay balls.

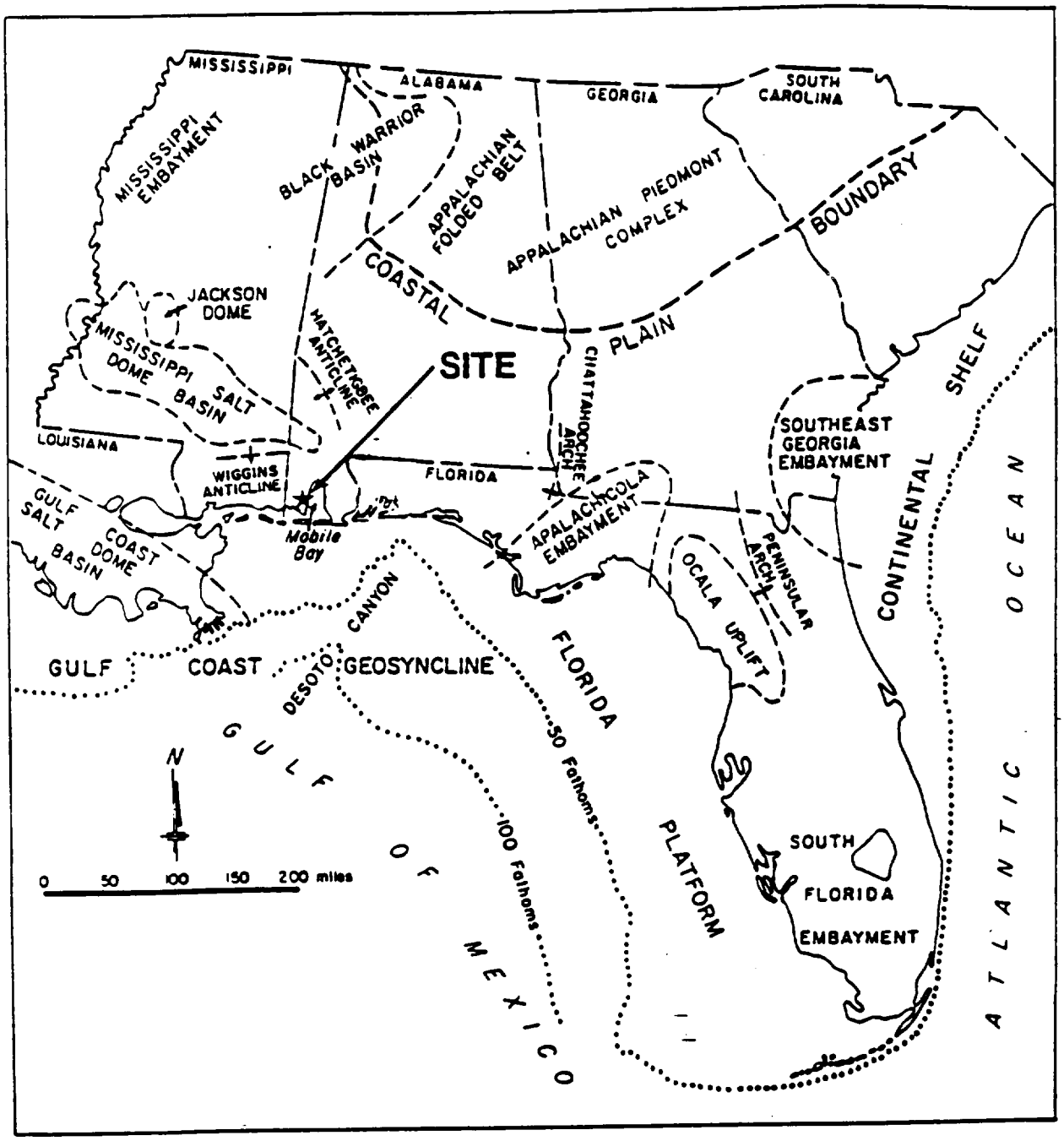


Figure II-11. Map Showing Regional Geologic Setting of Kay-Fries Facility.

Series	Geologic units	Thickness (feet)	Lithology	Yield		Quality of water
Holocene and Pleistocene	Alluvium, low-terrace, and coastal deposits	0-150	Sand, white, gray, orange, and red, very fine to coarse-grained, contains gravel in places; gray and orange sandy clay.	Will yield 10 gpm where saturated sands are of sufficient thickness. Potential source of 0.5 to 1 mgd per well in the Mobile River basin.		Water generally suitable for most uses but commonly contains iron in excess of 0.3 mg/l and may be sufficiently acidic to be corrosive. Locally, in areas close to Mobile Bay and Mississippi Sound, water is very hard, has high chloride and dissolved-solids contents, and contains iron in excess of 0.3 mg/l.
	High-terrace deposits	0-40		Will yield 10 gpm or more where saturated sands are of sufficient thickness.		Probably soft and low in dissolved solids. May contain iron in excess of 0.3 mg/l.
Pliocene	Citronelle Formation	0-200	Sand, brown, red, and orange, fine- to coarse-grained, gravelly in places, contains clay balls and partings; gray, orange, and brown lenticular sandy clay, ferruginous cemented sandstone.	Miocene-Pliocene aquifer	Will yield 1 mgd or more per well.	Water generally is soft and low in dissolved solids but may contain iron in excess of 0.3 mg/l and may be sufficiently acidic to be corrosive. In areas adjacent to Mobile River, Mobile Bay, and Mississippi Sound, water may have a dissolved-solids content that exceeds 1,000 mg/l, a sulfurous odor, and a chloride content that exceeds 500 mg/l.
Miocene	Miocene Series undifferentiated	400-3,400	Sand, gray, orange, and red, very fine to coarse-grained, contains gravel in places; gray thin-bedded to massive sandy silty clay; gray thin-bedded limestone in subsurface.			

Figure II-12. Lithologic and Hydrologic Characteristics of Stratigraphic Units of Interest , Kay-Fries (Reference 25).

The thickness of the Citronelle near the facility is approximately 70 feet, with dips of 5 to 12 feet per mile (References 25, 94).

Exposed sediments of the Pleistocene-Holocene series consist of alluvial, low terrace, and coastal deposits composed of unconsolidated sandy clay, silt, sand, and gravel. The terrace deposits represent floodplain remnants and reworked sediments from the older Citronelle and Miocene formations. Individual sand and gravel beds in the Holocene alluvium are lenticular in shape and represent buried channel deposits. The sands vary in grain size from very fine- to coarse-grained. The Pleistocene-Holocene deposits in the vicinity of Kay-Fries are approximately 70 feet thick, with a southwesterly dip of 5 to 12 feet per mile (Reference 25).

The principal aquifer in the vicinity of Kay-Fries is the Miocene-Pliocene aquifer which is under confined (artesian) conditions at the facility. The top of the aquifer generally occurs 125 to 150 feet below the land surface, with individual sand beds being 50 to 100 feet thick. The regional groundwater flow is south-southwesterly, the same direction as regional dip. Well yields may exceed one million gallons per day. Groundwater in this aquifer is recharged by precipitation in areas west and north of the facility, as shown in Figure II-13 (Reference 25).

Groundwater is present in the Pleistocene-Holocene deposits under unconfined, or water-table, conditions. The aquifer is recharged

Table 1. Selected Population and Housing Characteristics: 1990
Mobile County, Alabama

The population counts set forth herein are subject to possible correction for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 15, 1991. The user should note that there are limitations to many of these data. Please refer to the technical documentation provided with Summary Tape File 1A for a further explanation on the limitations of the data.

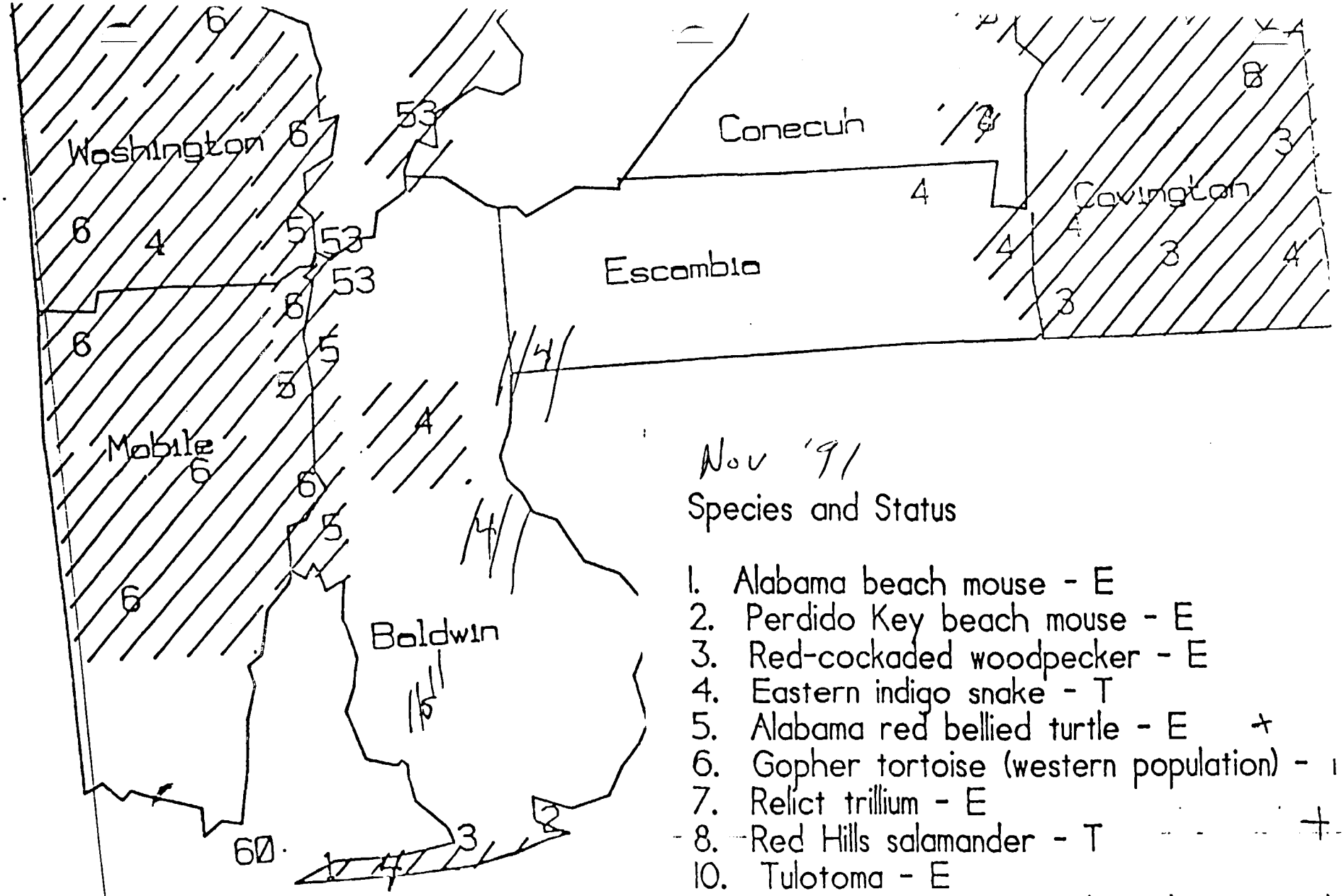
Total population	378,643
SEX	
Male	179,577
Female	199,066
AGE	
Under 5 years	29,633
5 to 17 years	78,400
18 to 20 years	17,984
21 to 24 years	21,429
25 to 44 years	116,996
45 to 54 years	37,951
55 to 59 years	15,727
60 to 64 years	15,868
to 74 years	26,622
to 84 years	14,155
85 years and over	3,878
Median age	31.9
Under 18 years	108,033
rcent of total population	28.5
ars and over	44,655
rcent of total population	11.8
HOUSEHOLDS BY TYPE	
Total households	136,899
Family households (families)	100,814
Married-couple families	73,628
Percent of total households	53.8
Other family, male householder	4,309
Other family, female householder	22,877
Nonfamily households	36,085
Percent of total households	26.4
Householder living alone	31,851
Householder 65 years and over	12,548
Persons living in households	371,562
Persons per household	2.71
GROUP QUARTERS	
Persons living in group quarters	7,081
Institutionalized persons	3,951
Other persons in group quarters	3,130
RACE AND HISPANIC ORIGIN	
White	254,853
Black	117,872
Percent of total population	31.1
erican Indian, Eskimo, or Aleut	1,940
ercent of total population	0.5
Asian or Pacific Islander	3,398
Percent of total population	0.9
Other race	580
Hispanic origin (of any race)	3,164
Percent of total population	0.8

Total housing units	151,220
OCCUPANCY AND TENURE	
Occupied housing units	136,899
Owner occupied	91,513
Percent owner occupied	66.8
Renter occupied	45,386
Vacant housing units	14,321
For seasonal, recreational, or occasional use	1,083
Homeowner vacancy rate (percent)	2.3
Rental vacancy rate (percent)	10.1
Persons per owner-occupied unit	2.81
Persons per renter-occupied unit	2.52
Units with over 1 person per room	5,961
UNITS IN STRUCTURE	
1-unit, detached	107,031
1-unit, attached	2,678
2 to 4 units	10,311
5 to 9 units	8,066
10 or more units	10,191
Mobile home, trailer, other	12,943
VALUE	
Specified owner-occupied units	75,273
Less than $50,000	34,210
$50,000 to $99,999	32,696
$100,000 to $149,999	5,171
$150,000 to $199,999	1,617
$200,000 to $299,999	1,049
$300,000 or more	530
Median (dollars)	53,300
CONTRACT RENT	
Specified renter-occupied units paying cash rent	40,878
Less than $250	22,940
$250 to $499	16,910
$500 to $749	798
$750 to $999	98
$1,000 or more	132
Median (dollars)	233
RACE AND HISPANIC ORIGIN OF HOUSEHOLDER	
Occupied housing units	136,899
White	96,804
Black	38,408
Percent of occupied units	28.1
American Indian, Eskimo, or Aleut	616
Percent of occupied units	0.4
Asian or Pacific Islander	893
Percent of occupied units	0.7
Other race	178
Hispanic origin (of any race)	1,068
Percent of occupied units	0.8

reference 7

PWS ID1	PWS ID2	PWS TYPE	ACTIVITY FLAG	SYSTEM NAME
AL	0000245	C	A	HOLLINS WATER & FIRE PRO AUTHORITY
AL	0000719	C	A	HOLLYWOOD WATER WORKS
AL	0000721	N	A	MUD CREEK CAFE
AL	0000877	N	A	GRAND MARINER MARINA
AL	0000959	P	I	BELLINGRATH GARDENS
AL	0000961	N	A	SS MARINA RESTAURANT
AL	0000969	N	A	FOWL RIVER HARBOR, INC.
AL	0000972	P	I	M-I DRILLING FLUIDS, CO.
AL	0000974	P	I	JEWISH COM. CENTER
AL	0000978	P	I	FAITH ACADEMY
AL	0000984	C	A	GREEN OAKS MOBILE HOME PARK
AL	0000985	P	I	FOUR STAR OIL & GAS CO
AL	0000989	C	I	INDIAN SPRINGS MOBILE VILLAGE
AL	0000998	C	I	MAGNOLIA TRAILER COURT
AL	0000999	P	A	WESTWOOD MANOR/MOBILE MENTAL HEALTH
AL	0001001	P	I	BARBERS PURE MILK CO
AL	0001002	C	A	MOBILE COUNTY WATER & FIRE PRO AUTHORITY
AL	0001005	C	A	MOBILE WATER SERVICE SYSTEM
AL	0001007	C	A	OLD SHELL MOBILE HOME PARK
AL	0001010	C	I	PINE ACRES MOBILE HOME ESTATES
AL	0001018	C	A	RIDGEWOOD ACRES MOBILE HOME PARK
AL	0001032	P	A	TANNER WILLIAMS ELEMENTARY SCHOOL
AL	0001040	C	I	WOODLAND OAKS TRAILER COURT
AL	0001452	C	I	WESTERN PARK
AL	0001501	P	I	INTERNATIONAL PAPER CO.
AL	0001745	P	A	YMCA OF METROPOLITAN MOBILE, INC.

Reference 8



Nov '91

Species and Status

1. Alabama beach mouse - E
2. Perdido Key beach mouse - E
3. Red-cockaded woodpecker - E
4. Eastern indigo snake - T
5. Alabama red bellied turtle - E +
6. Gopher tortoise (western population) - T
7. Relict trillium - E
8. Red Hills salamander - T +
10. Tulotoma - E
11. Alabama canebrake pitcher plant - E +

and ecology of the species. Nothing is known of the ecology of adults when not breeding.

BASIS FOR STATUS CLASSIFICATION. The remarkable distribution of disjunct populations of this frog make it a subject valuable to the study of biogeography and evolution. In addition, the Alabama-Florida populations differ significantly from those of the Atlantic Coastal Plain in aspects of their morphology, ecology, and call structure. The ecology, distribution, and habitat of this species suggest that it was formerly more widespread during milder, wetter climates. If true, living populations of the Pine Barrens treefrog could be considered "physiological relicts," possibly best adapted to some Pleis[illegible]ne climates.

B[illegible] only 22 localities are known in Alabama and because the only efforts to preserve the integrity of the species' delicate and rare habitats are those directed at a few places in Conecuh National Forest, the status of "Threatened" is warranted. In Florida, the frog was found to be much more common and widespread than was believed earlier, resulting in its being removed from the "Federal List of Endangered Species." That state nevertheless retains it on its list of "Species of Special Concern."

RECOMMENDATIONS. Fire is important in maintaining the integrity of the bog habitats, and periodic burning, preferably in late summer or fall, would greatly improve some of the marginally suitable habitats that may ultimately be lost otherwise. Attempts to drain the boggy areas or to convert them to hog wallows and ponds, common practices in the frog's range, should be avoided or discouraged.

Studies on the restrictive physiological breeding ecology of this species are needed, as well as investigations into the ecology of nonbreeding individuals, an aspect of the biology of this species about which almost nothing is known.

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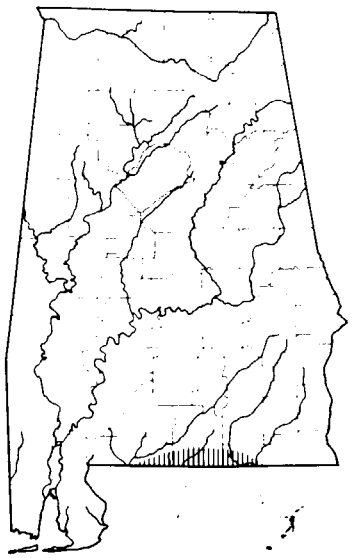
PREPARED BY: D. Bruce Means, Coastal Plains Institute, 1313 N. D[illegible]al St., Tallahassee, Florida 32303.



Range of Pine Barrens treefrog.

Threatened

DUSKY GOPHER FROG

Rana areolata sevosa Goin and Netting
Family Ranidae
Order Salientia

OTHER NAMES. Dusky crawfish frog

DESCRIPTION. A stout-bodied, spotted frog up to 10 cm (4 inches) head-body length, with a rather large head and a thick ridge of skin extending down the back behind each eye. The toes taper to rounded points and the snout is somewhat pointed. Back rough-textured, gray or light brown with dark blotches and smaller dark markings. Belly and throat whitish with numerous small spots and vermiculations; inner surfaces of hind leg and adjacent belly portions washed with yellow.

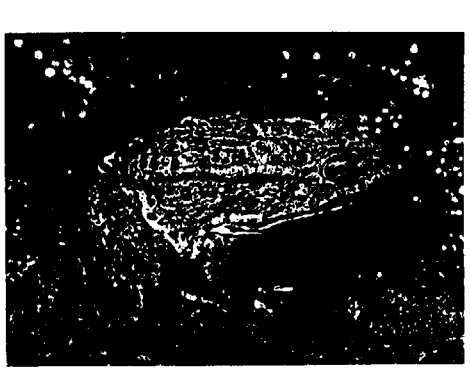


FIG. 25. Dusky gopher frog (Robert H. Mount).

RANGE. The gopher frog complex of subspecies of the species *R. areolata* occurs from Louisiana to Florida and northward in the Coastal Plain to North Carolina. The ranges of the various subspecies and zones of intergradation between them are not well known. In Alabama, all populations of *R. areolata* are tentatively assigned to the subspecies *R. a. sevosa*. The few Alabama records are from Mobile, Baldwin, Escambia, Covington, and Barbour counties. In addition, the existence of a population in Shelby County, far removed from the others and until recently considered questionable, has been verified by the discovery of a second specimen in the same general area where the first was found (Guthrie, 1985).

HABITAT. Open longleaf pine-scrub oak forests developed on sandy soils, the favored habitat of the gopher tortoise (*Gopherus polyphemus*) in Alabama, is probably the principal habitat of this poorly known and secretive frog. The highly terrestrial, metamorphosed frog lives sometimes up to 1 mile from open water and spends its days underground in tortoise burrows, mammal burrows, and possibly to some extent in crawfish holes. At night it emerges to feed on insects and other small animals.

LIFE HISTORY AND ECOLOGY. Breeding occurs usually in February and March in temporary ponds, ditches, and borrow pits, but the species may be able to breed "explosively" at any time of the year following unusually heavy rains. Males emit a distinctive snoring call that can be heard at least 0.5 km away. Females may not breed every year, but lay hundreds of eggs when they do. The greenish yellow tadpole is large, full-bodied, long-tailed, and spotted over the upper surface and tail fin. Transformation occurs in 90-120 days and the small froglets are believed to migrate to dry terrestrial habitats to grow to maturity.

BASIS FOR STATUS CLASSIFICATION. Because of the small number of populations known in Alabama, rapid decline in amount and quality of breeding and non-breeding habitat, and its close association with the threatened gopher tortoise, the dusky gopher frog is considered threatened.

RECOMMENDATIONS. Much remains to be learned about this secretive frog. Studies of its breeding cycle, population biology, and larval ecology should be undertaken in conjunction with a thorough survey to determine the seriousness of its status in Alabama. In addition, efforts should be made to educate land managers and the general public on matters relating to the importance and conservation of the longleaf pine-scrub oak (sandhill) ecological association in Alabama. Any known breeding sites for gopher frogs should be called to the attention of the owners or managers of the lands on which the sites occur to ensure against inadvertent or needless destruction.

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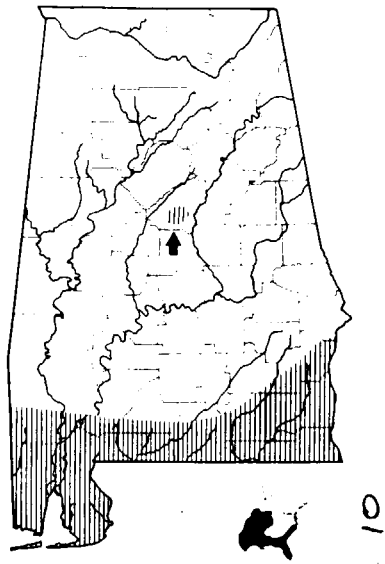

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Threatened

EASTERN HELLBENDER

Cryptobranchus alleganiensis alleganiensis (Daudin
Family Cryptobranchidae
Order Caudata

OTHER NAMES. Mudpuppy, mud-dog, waterdog, w[illegible] lizard, and walking catfish.

DESCRIPTION. The hellbender is a very large aquatic [illegible] amander, reaching a maximum total length of 74 cm (ca[illegible] inches). The trunk and head are dorso-ventrally flatte[illegible] and the tail muscular, well developed, and laterally c[illegible] pressed. Between front and hind limbs are extensively

components of the range, where losses have been most severe. Memoranda of understanding similar to that executed with I.P.C. should be secured, whenever possible, from landowners. Educational efforts directed at enhancing the welfare of the Red Hills cave and ravine fauna and flora would be helpful.

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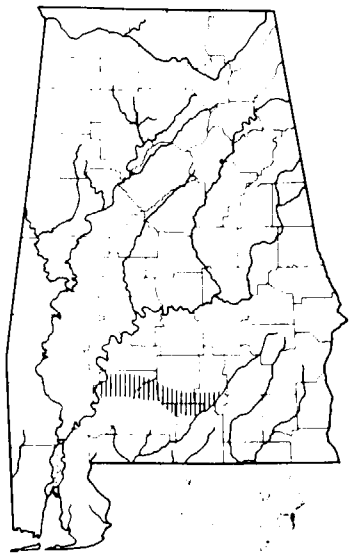

Range of th Hills salamander.

Threatened

SOUTHERN HOGNOSE SNAKE

Heterodon simus (Linnaeus)
Family Colubridae
Order Squamata
Suborder Serpentes

OTHER NAMES. Puff adder, spreading adder, and ground rattler.

DESCRIPTION. A short, stout snake attaining a maximum length of 610 mm (24 inches), but averaging 360-510 mm (14-20 inches). Snout shovel-shaped and *sharply* upturned, underside of tail and belly about the same color. (In the eastern hognose, the snout is pointed, but not conspicuously upturned, and the tail undersurface is usually lighter than the belly.) Back with mid-dorsal dark blotches, these alternating with smaller dorsolateral blotches. Ground color gray, brown, or yellowish, often with tinges of red between dorsal blotches. Melanistic (black) individuals unknown.

FIG. 28. Southern hognose snake (Robert H. Mount).

RANGE. Generally, the Coastal Plain from North Carolina to southern Florida and southern Mississippi. In Alabama records are available from Butler, Clarke, Baldwin, Escambia, Covington, and Dale counties in the southern portion; Autauga and Shelby counties in the central portion; and Calhoun County in the northeastern portion. The Shelby and Calhoun county localities are in the Ridge and Valley Region, above the Fall Line.

HABITAT. Open woods, fields, and waste places having relatively sandy soils. Most specimens have been found in dry situations, although one was recently picked up while swimming in the open water of Lake Eufaula (Ed Wester, per comm.), near the Georgia shore.

LIFE HISTORY AND ECOLOGY. The natural history of this snake remains poorly known. Some observations suggest that it is more inclined to be fossorial (burrowing) than its more common relative, the eastern hognose. Like the latter, the southern hognose often displays a fearsome appearance and a menancing behavior when molested—hissing, blowing, and spreading the head and neck in cobralike fashion. These manifestations belie the snake's true demeanor—for if the molestation continues, it rolls over, feigns death, and steadfastly refuses to bite its tormentor.

The southern hognose is oviparous, but natural nests are unknown. Data suggest that clutch size ranges from 6-10. Apparently, the diet is limited almost exclusively to toads.

BASIS FOR STATUS CLASSIFICATION. Although the southern hognose may never have been particularly common in Alabama, it could until a decade or so ago be found in a few places in the State with some regularity. This appears to be no longer the case, and population densities today are believed to be at an all-time low. Reasons for the decline are not apparent. Imported fire ant predation on the eggs and/or young is believed by one herpetologist to be a factor in the decline. Persecution by man and highway mortality may be contributing.

RECOMMENDATIONS. A comprehensive status survey is needed, as are studies to determine limiting factors. This snake would profit, as would most other harmless snake species, from educational programs designed to develop a greater environmental awareness on the part of Alabama's citizens and its leaders.

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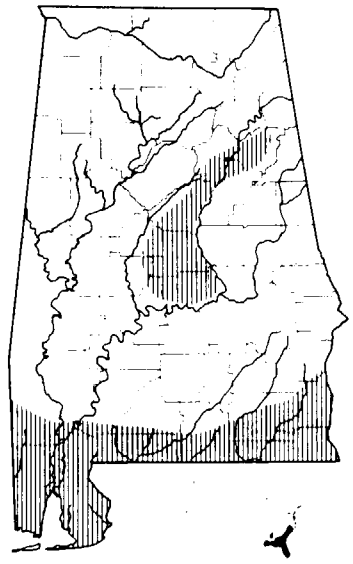
PREPARED BY: Robert H. Mount, Department of Zoology-Entomology, Auburn University, Alabama 36849.



Range of the southern hognose snake.

Threatened

BLACK PINE SNAKE

Pituophis melanoleucus lodingi Blanchard
Family Colubridae
Order Squamata
Suborder Serpentes

OTHER NAMES. Black bull snake.

DESCRIPTION. Large, attaining a maximum tot of 188 cm (74 inches). Rostral scale (at snout tip) e curving backward and ending in a point between color of adults almost uniform black or dark brown, occasional individual having a few white scales and/o a pattern; young tend to be patterned, with black blo a brown background, on the posterior three-fourt body. Scales on body keeled. (The only other blac found within the range of the black pine snake are t racer and eastern indigo snake, both of which have body scales).

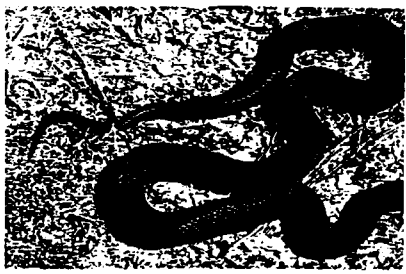


FIG. 29. Black pine snake (Robert H. Mount).

RANGE. Southern Mississippi, extreme soutl Louisiana (?), and southwestern Alabama, where it recorded from Mobile, Clarke, and Washington The snake may ultimately be found in southern County. The black pine snake intergrades with the pine snake, in Alabama, in Baldwin, Escambia, and ton counties.

HABITAT. Most often found in areas with san drained soil. Sandhill (longleaf pine-scrub oak) ass and similar habitats, and relatively small openings places, seem well suited.

LIFE HISTORY AND ECOLOGY. Aside from a eral observations, little is known of this rare snake ural environment. It is believed to spend consider underground, in burrows of gopher tortoises and rod possibly in some it constructs itself. Principal food lieved to be rodents, birds, and bird's eggs.

The black pine snake has been bred successfully ity. In a detailed account of such, courtship and m curred in late April, oviposition of 7 eggs occurr May, and hatching 65-68 days later.

BASIS FOR STATUS CLASSIFICATION. Bl snakes have declined substantially in Alabama d past 15-20 years. No longer can they be found wit gree of predictability as was the case previously. In

sive search for the snakes in Alabama during the warm season of 1982 by employees of the U. S. Fish and Wildlife Service (561 km driven and 64.4 hours spent), no black pine snakes were found, living or dead.

Reasons for the decline are unknown. All or a combination of the following may be involved: gassing of gopher tortoise burrows, deliberate killing or collecting, highway mortality, detrimental forestry practices (e.g. mechanical site preparation, use of herbicides, institution of artificial burning regimes), and detrimental agricultural practices.

RECOMMENDATIONS. The habits of the black pine snake should be investigated, using telemetry and the new [illegible]sique for investigating burrows and cavities (see Speake [illegible]tiere, 1983). A more thorough status survey, employing the latter, should be conducted. Appropriate conservation education programs should be implemented. The impact of forestry practices now being employed within the snake's range should be investigated. Legal protection against commercial exploitation should be instituted immediately, since black pine snakes command a premium price in the "pet trade." A ban on collecting and/or possession of black pine snakes, except for scientific or educational purposes, would be helpful.

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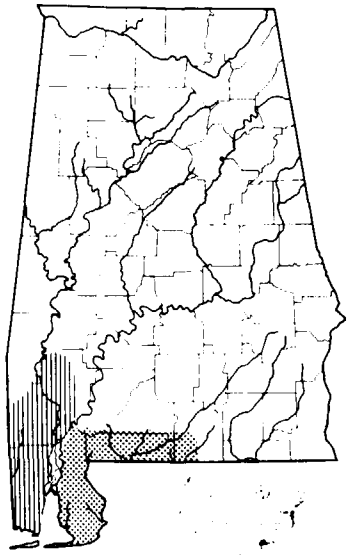

Range of the bl[illegible]k pine snake (shaded). Stippled area indicates a zone of intergradati[illegible] the Florida pine snake.

Threatened

FLORIDA PINE SNAKE

Pituophis melanoleucus mugitus (Barbour)
Family Colubridae
Order Squamata
Suborder Serpentes

OTHER NAMES. Bull snake, gopher snake.

DESCRIPTION. One of Alabama's largest snakes, attaining a maximum length of about 229 cm (90 inches). Color varies from light gray anteriorly to rusty-brown posteriorly; dorsal blotches are usually indistinct anteriorly, but brown to rust-colored blotches may be distinct posteriorly. Like the other pine snakes in Alabama, the body is moderately stout and the rostral scale is enlarged. (See description of *P. m. melanoleucus*.)

FIG. 30. Florida pine snake (Ray E. Ashton, Jr.).

RANGE. Florida, southern Georgia, southeastern Alabama, and extreme southern South Carolina. In Alabama, specimens have been collected from Russell, Covington, and Crenshaw counties. Intergrades with the black pine snake and the northern pine snake in southwestern and central Alabama, respectively. (See accounts of those subspecies.)

HABITAT. Usually found in the sandhill habitat where longleaf pine (*Pinus palustris*) and scrub oaks are dominant and gopher tortoises and pocket gophers occur. Clearings in such areas, especially abandoned fields, may also be inhabited.

LIFE HISTORY AND ECOLOGY. This snake is known to commonly use burrows of gopher tortoises and pocket gophers as shelters. The diet includes rodents, birds, and eggs of birds and reptiles. As with other pine snakes, *P. m. mugitus* is believed to spend much of its time undergro[illegible] Observers have reported clutches of eggs of from 4 to 8 white to cream-colored eggs.

BASIS FOR STATUS CLASSIFICATION. Florida pine snakes have always been of local occurrence and cannot be said to be common anywhere in Alabama. The sandhill habitat is being lost and altered at a rate that should elicit concern for all of its biotic components. Since the Florida pine snake is a well-known user of gopher tortoise burrows, it is especially vulnerable in areas where the practice of "gassing" these burrows to drive out rattlesnakes is common. Research on some ecological effects of "gassing" tortoise burrows has shown that Florida pine snakes gassed in the burrows with gasoline fumes died within 24 days.

RECOMMENDATIONS. The movements and habitat requirements of this snake in Alabama are poorly known and should be investigated with radio telemetry techniques and also as a part of research into the value of burrows of gopher tortoises and pocket gophers to wildlife. Newly developed equipment will permit visual examination of the burrows' innermost recesses. Establishment of some sandhill sanctuaries would benefit the snake as would restrictions on tortoise burrow gassing.

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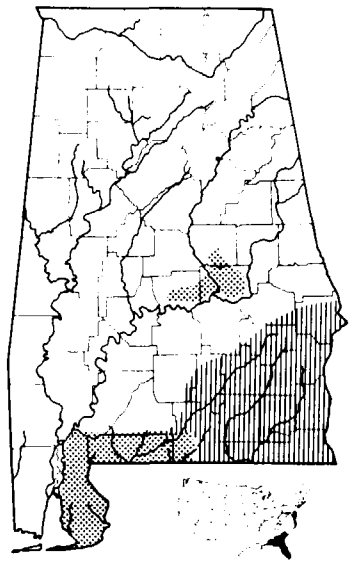

Range of the Florida pine snake (shaded). Stippled area in southern Alabama indicates a zone of intergradation with the black pine snake; that in central Alabama, one with the northern pine snake.

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Threatened

BARBOUR'S MAP TURTLE

Graptemys barbouri Carr and Marchand
Family Emydidae
Order Testudines

OTHER NAMES. Barbour's Sawback Turtle.

DESCRIPTION. This large, aquatic turtle exhibi[illegible] markable degree of sexual dimorphism. Females atta[illegible] pace lengths of 20 to 30 cm (8 to 12 inches) and devel[illegible] sive heads that appear disproportionate to their bodi[illegible] males are relative dwarfs by comparison; they rarely[illegible] 13 cm (5 inches) and achieve only 20 percent of the bo[illegible] of the average female. Carapace with a median keel[illegible] tuated by prominent, black-tipped spines or knobs on[illegible] through fourth vertebrals. These spines become inc[illegible] uous in adult females. Carapace typically olive-gre[illegible] light yellow, circular to C-shaped markings on cost[illegible] marginals, these markings frequently obscured in o[illegible] males as the ground color darkens. Plastron pale yell[illegible] unmarked except for narrow dark lines along th[illegible] (seams). Head has an olive-green background with [illegible] yellowish to pale green blotch behind each eye. Chin [illegible] isolated light bar paralleling the jaw, followed by a li[illegible] verted, U-shaped mark. Limbs and tail striped.

FIG. 31. Barbour's ma[illegible]e, adult female (Robert H. Mount).

RANGE. The species is restricted to the Apalachicola River system. This includes the Chipola (from which it was first described in 1952) and Apalachicola rivers in Florida, the Flint River in Georgia, and the Chattahoochee River along the Alabama-Georgia border. In the last it occurs northward at least to Russell County but is exceedingly scarce throughout. Some Alabama tributaries of the Chattahoochee and Chipola rivers are possibly inhabited.

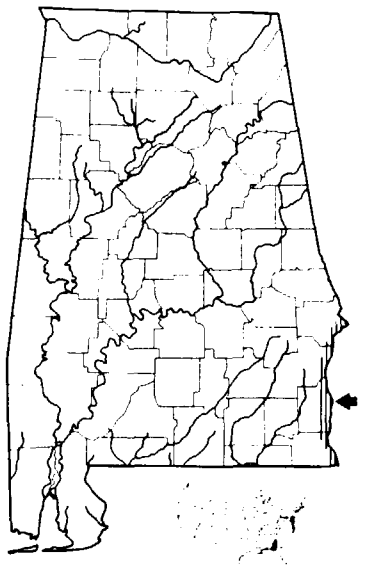
HABITAT. *Graptemys barbouri* is exclusively a turtle of rivers and associated habitats. Greatest numbers occur along stretches with considerable amounts of exposed limestone and abundant snags and stumps for basking. Occasionally the ...ies may be found in river swamps or impoundments, but ...e habitats seem suboptimal.

LIFE HISTORY AND ECOLOGY. Barbour's map turtle is wholly carnivorous. Diets of males and small females consist principally of caddisfly larvae and other aquatic insects. Adult females use the massive head musculature and expanded oral crushing surfaces to feed almost exclusively on molluscs, particularly native snails of the genus *Elimia* and the introduced bivalve, *Corbicula manilensis*.

Nesting occurs during late spring and early summer with most adult females presumably nesting three to four times during this period. Four to 11 eggs typically are laid in a cavity a few centimeters beneath the surface, within a few meters of the water, on sandbars and riverbanks. Although males may mature in 3 to 4 years, females may take as long as 15 to 20 years to achieve sexual maturity.

BASIS FOR STATUS CLASSIFICATION. Restriction to a single drainage system makes any species highly vulnerable. The Apalachicola River system repeatedly has been impounded for reservoirs, dredged for barge traffic, and poisoned and otherwise polluted through human negligence. Additionally, female *Graptemys barbouri* have been depredated by man in the past for food. Although effects of these multiple threats to the species have not been analyzed, their impact on a late-maturing, mollusc-feeding species could be severe. The species also has considerable demand in the pet ..., which could contribute to the decline of some popu...ns.

RECOMMENDATIONS. Populations of this species should be surveyed and monitored throughout the range to obtain baseline data against which the effects of the aforementioned threats can be measured. Pollution and dumping in the rivers should be kept at a minimum. Collecting, except for valid scientific research, should be prohibited, and shooting the turtles should be made illegal. The impact of using "bush hooks" may be substantial in some places, and consideration should be given to regulating such use.



Range of Barbour's map turtle.

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Threatened

ALABAMA RED-BELLIED TURTLE

Pseudemys alabamensis Baur
Family Emydidae
Order Testudines

OTHER NAMES. Red-belly.

DESCRIPTION. A large freshwater turtle attaining a carapace length of 335 mm (13.2 inches) in females and 295 mm (11.6 inches) in males. Shell high-domed and thick. Carapace oval, slightly serrated behind and wrinkled, becoming increasingly so anteriorly. Prominent oblique rugosities develop with age on outer margins of costal scutes. Background carapace coloration greenish, olive, brown, or blac... Typical markings on costals and marginals cream, yellow, orange, or red. Plastron and bridge large, rigid, the surfaces grainy in large individuals. Plastron plain to ornate, the markings consisting of dark bars and variously shaped dark figures that may be isolated or interconnected. Plastral ground color cream, yellow, orange, or red. Soft parts and head deep olive to black with cream or yellow striping.

Terminal notch of upper jaw normally flanked on each side by distinct toothlike cusp, a feature found in no other *Pseudemys* turtle in Alabama.

FIG. 32. Alabama red-bellied turtle (Robert H. Mount).

RANGE. Currently considered by most authorities to occur only in Alabama, where it is found chiefly in the lower portion of the Mobile Bay drainage in Mobile and Baldwin counties. Other records include Little River State Park Lake, Monroe County, and Dauphin Island, Mobile County, the latter doubtless represented by a waif. "Records" from Florida are believed to be *P. concinna*, *P. floridana*, or *P. nelsoni*, and those from Texas and Tennessee are probably misidentified *P. concinna*. Reports of this species' occurring in the lower Pascagoula River Drainage in Mississippi are being investigated. A status survey of the species has recently been completed. (See Addendum.)

HABITAT. This turtle is most abundant in fresh to moderately brackish water in a stretch of the Tensaw River between Hurricane Landing and the causeway across the northern part of Mobile Bay. Areas where submerged aquatic vegetation is abundant are preferred.

LIFE HISTORY AND ECOLOGY. The species is primarily if not exclusively herbivorous. Gravine Island, Baldwin County, is believed to be the primary nesting site, where nesting occurs during a period of about 3 months. Clutch size is between 4 and 9; average number of nestings per female per season is unknown. Nothing is known about growth, age to maturity, courtship, mating, or population dynamics.

BASIS FOR STATUS CLASSIFICATION. This species has declined noticeably within the past 1 to 2 decades. The animal is trapped and netted for food. On Gravine Island, fish crows take an extremely high proportion of the eggs, as humans and hogs once did, and recent research indicates a high rate of egg predation by the imported fire ant. Recreationists using the island disrupt the turtle's nesting inadvertently. The beds of elodea (*Anacharis* sp.) and other aquatic vegetation in the Tensaw River, believed to be an important food source, have declined recently, perhaps as a result of herbicide application. Alligators, known to prey on emydid turtles, have increased substantially in the turtle's range ar... contributing to the decline. "Snagging" decrease... site availability, and heavy boat traffic on the rive... deleterious. These factors, along with species' ... range, warrant the indicated status.

RECOMMENDATIONS. Additional studies on ...cies' life history and ecology are needed. Serious ... tion should be given to acquiring Gravine Island for ... sanctuary for this species and several other turtle in... of the lower Tensaw River area. Meanwhile, the u... bicides in the aquatic habitats in the area should be ...aged, and snagging done only where absolutely n... Commercial collecting of this species should be ma... ful.

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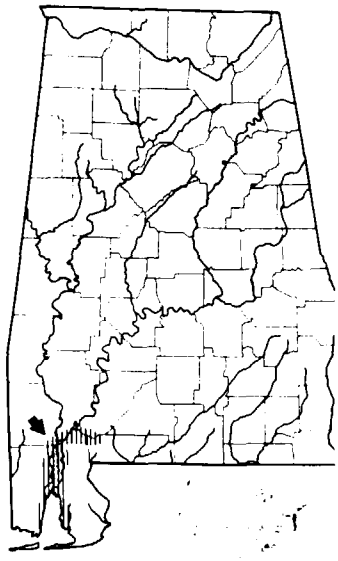
PREPARED BY: James L. Dobie, Department of Entomology, Auburn University, Alabama 36849.



Range of the Alaba..._____bellied turtle.

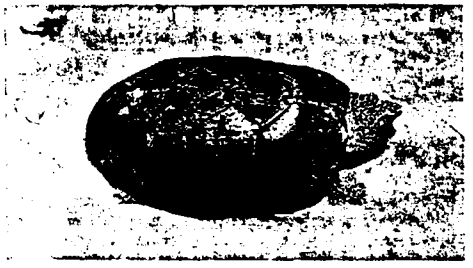
Threatened

FLATTENED MUSK TURTLE

Sternotherus minor depressus Tinkle and Webb
Family Kinosternidae
Order Testudines

OTHER NAMES. None.

DESCRIPTION. A small freshwater turtle attaining a maximum carapace length of 119 mm (ca. 4.75 inches). Carapace flattened, with scutes overlapping; plastron relatively small, the anterior lobe slightly movable; pectoral scute of p[illegible]on quadrangular or rectangular; normally one gular s[illegible]resent; chin with barbels. Carapace color brown, with dark lines, these becoming less conspicuous or absent on old individuals. Limbs and tail brown, unstriped. Top of head greenish with a reticulum or network of dark markings, this often changing to form spots or blotches on top of snout. Head may or may not be enlarged in adults. Plastron pink in young, yellowish in adults. (Note: Occasional individuals of other Alabama musk turtles, especially older ones, exhibit flattening of the carapace, especially in habitats similar to those exploited naturally by *depressus*. This is probably the result of convergent evolution.)



1 . **Flattened musk turtle (Robert H. Mount).**

RANGE. An Alabama endemic, the flattened musk turtle is found only in acceptable habitats in the upper portion of the Black Warrior River system, upstream from Bankhead Dam. A zone of intergradation between it and the stripe-necked musk turtle, *S. m. peltifer*, occurs in the Warrior system from Holt Reservoir to the vicinity of Tuscaloosa. This zone includes North River and several tributaries to Holt Reservoir. (Note: Some authorities contend that *depressus* is a distinct species.)

HABITAT. The turtle occurs in free-flowing streams and stream impoundments having some shallow water, substrates with some rock or cobble, and sufficient invertebrate life, preferably in the form of molluscs, for food. Relatively small creeks as well as larger streams are inhabited. The turtle appears to be detrimentally affected by silt and sediment and less tolerant of other habitat degradation than most other aquatic turtle species within the range.

LIFE HISTORY AND ECOLOGY. The flattened musk turtle is a bottom-dweller and apparently fairly sedentary. The adult[illegible] active chiefly from dusk to mid-morning. Basking occurs infrequently; one researcher has suggested that basking behavior is possibly an abnormal response to unfavorable conditions in the habitat or to poor health. Age at maturity is 4 to 6 years in males, at which age they are about 70 mm in carapace length. Females attain maturity in 6 to 8 years, carapace length 70-75 mm (David Close and Kenneth Dodd, pers. comm.).

Only one natural nest is known; it contained 2 eggs (K. Dodd, pers. comm.). On the basis of examination of female reproductive tracts, it has been determined that two clutches of eggs, averaging 3 each, are produced per season. The last clutch is laid from mid-June to late July or early August. Maximum egg number per season is 8 and average is 4.2 (David Close, pers. comm.). Hatching has been observed twice. Three hatchlings, after the carapace had fully expanded, ranged from 26.9 to 27.5 mm in length and 23.4 to 26 mm in width. Longevity is unknown, but under favorable conditions the turtles are believed capable of attaining a relatively old age, compared to other vertebrates.

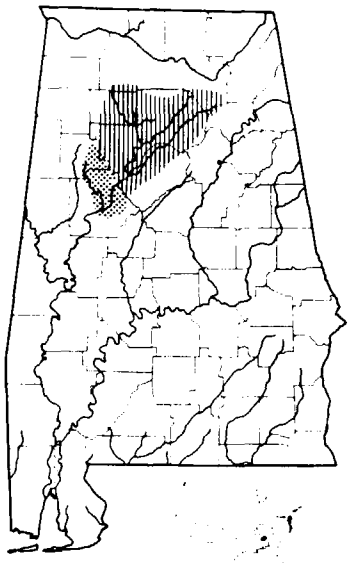
BASIS FOR STATUS CLASSIFICATION. The latest information available indicates a continuing decline in the populations of *depressus* over the majority of the range. In addition, the ratio of juveniles to adults seems to have undergone a substantial decrease within the past 10 to 20 years. Data suggest that *depressus* is strongly "k-selected," and thus more susceptible to many of the adversities caused by man's activities than other forms of life might be.

Although the factors responsible for the apparent declines are not known with certainty, excessive accumulations of silt and sediment, some of which are possibly toxic, are strongly implicated in the case of some habitats. Strip mining for coal occurs over most of the range, and abandoned, unreclaimed mined land is commonplace. Erosion during and following mining operations and drainage from old mines are believed to be important contributors to the problem, as are some activities associated with construction, forestry, and agriculture.

Industrial and municipal pollution are believed to be detrimental and may have eliminated some populations, and commercial collecting has recently emerged as a cause for concern. The 1984 Alabama Legislature recognized the threat of the latter to the turtle and enacted protective legislation. A "grandfather clause" exempting animals collected prior to enactment, and their progeny, however, makes the provisions difficult to enforce.

Considering the past degradation of the turtle's habitats, the threats the animal is facing, and the small geographic range it occupies, threatened status is warranted.

RECOMMENDATIONS. Existing regulations relative to water quality of streams within the turtle's range, as published by the Alabama Water Improvement Commission (now "Alabama Department of Environmental Management"), should be enforced, and, if necessary, strengthened to alleviate the degraded conditions that now prevail in many of the streams within the range. The aforementioned "grandfather clause" that permits continuing commercial trade in flattened musk turtles should be eliminated by legislative amendment. Because of the animal's depleted status and the numerous, continuing threats to its populations and habitat, THE FLATTENED MUSK TURTLE HAS BEEN PRO[illegible]OSED



Range of the flattened musk turtle is shaded. Stippling indicates a zone of intergradation with the stripe-necked musk turtle, *Sternotherus minor peltifer*.

FOR LISTING AS A THREATENED SPECIES BY THE UNITED STATES DEPARTMENT OF THE INTERIOR (Nov. 1, 1985).

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Threatened

GOPHER TORTOISE

Gopherus polyphemus (Daudin)
Family Testudinidae
Order Testudines

OTHER NAME. Gopher.

DESCRIPTION. The gopher tortoise is a med large-sized turtle and the largest of our land turtles mens have been reported up to 34.5 cm (13.6 in length. Large specimens of about 30.5 cm (12 inches uncommon. The front limbs and toenails flattened an adapted for digging. The upper shell of adults is Hatchlings and young have yellow-centered scutes. parts of young are yellowish and become dark brow turtle matures.

FIG. 34. Gopher tortoise (Dan W. Speake).

RANGE. Populations occur in suitable habitats thr Florida. The range extends northward to extreme s South Carolina and westward in the Coastal Plain Georgia, across southern Alabama and Mississippi, southeastern Louisiana. Within this range the distri spotty. In Alabama the species is fairly common in s gions of the Lower Coastal Plain. Northward, gopher countered much less frequently. The upper limit of t is approximately the lower boundary of the Black Bel

HABITAT. Dry, sandy, or gravelly soils seem to quirement of this species. A recent study in Georg that all colonies were restricted to areas with deep sa supporting natural or altered sandhill vegetation. M tions were in longleaf pine-scrub oak habitats, plan stands that were sufficiently open for low-growing he vegetation to be abundant, and in openings within th itats.

LIFE HISTORY AND ECOLOGY. Various sp grasses are the staple foods of gopher tortoises. Oth such as wild legumes, are used extensively when a Fleshy fruits are eaten in season. Occasionally gopl been observed feeding on bones, droppings of other and even carrion.

Research in southern Georgia has shown that m curs from April through early June. Nesting activi

during the first 2 weeks in June and clutch size ranges from 4 to 12, which is very low in comparison to most of our other native turtles. Females are successful in producing young on the average of only once in about 10 years, chiefly as a result of the high rate of nest predation, averaging about 87 percent. For the first few years of life, juveniles are also vulnerable to predators. The tortoise grows slowly and, in Georgia and probably in Alabama, attainment of sexual maturity requires 16 to 21 years.

The gopher tortoise burrow is used not only by the tortoise but by some 30 other species of vertebrates and numerous invertebrates. Some of the latter are found nowhere else. The burrow of an adult gopher may extend from 1.8 m (6 feet) to r 12 m (39 feet) in length. However, few are longer than 10 .32 feet). Its cross-sectional dimensions vary with the animal's size. The depth may be from 1.5 m (5 feet) to 2.7 m (9 feet) or more, depending on soil depth and moisture. It is believed that animal biomass in the sandhill habitat is greatly increased by the presence of tortoise burrows. This habitat frequently has little cover and is subject to extremes of heat and cold. Research showed that indigo snake population density varied with the number of tortoise burrows on a study area. Relationships among the inhabitants of gopher burrows remain poorly understood.

BASIS FOR STATUS CLASSIFICATION. Conservationists have been concerned over declining gopher tortoise populations for several years. The rapid loss and alteration of sandhill habitat, the most important type, has been pointed out by numerous biologists, and the tortoise population decline documented as well. The gopher tortoise has a low reproductive potential and a low rate of reproductive success. It is slow to mature. The gopher is also widely exploited for food by people. The tortoise population can be severely affected by habitat changes; for example total fire exclusion brings about declining populations. In 1981, concern over the decline of the gopher in Alabama resulted in a conservation regulation designating the gopher tortoise a game animal and declaring, "there is no open season during which the gopher toise may be lawfully hunted, taken, caught, captured, or d."

RECOMMENDATIONS. Forestry practices that maintain good habitat quality should be promoted. Trees should be widely spaced and burning should be practiced. Sandhill habitat sanctuaries should be established where possible. Control of the mammals that are serious predators on tortoise eggs (especially raccoons) would be desirable, either through hunting or trapping. Man's activities have improved habitat for small predators and have destroyed the larger predators that once controlled their numbers. The public should be educated about the species' problems and the value of the gopher to the entire sandhill community.

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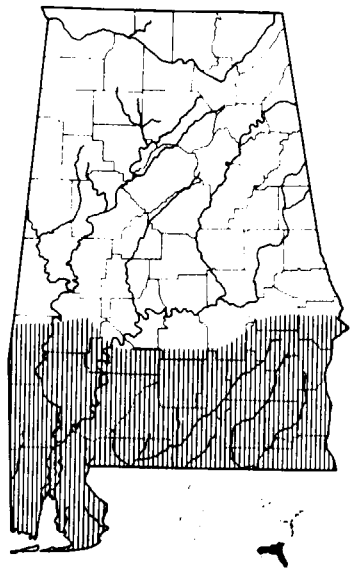

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PREPARED BY: Dan W. Speake, Alabama Cooperative Fish and Wildlife Research Unit, Auburn University, Alabama 36849.

Special Concern

FLATWOODS SALAMANDER

Ambystoma cingulatum (Cope)
Family Ambystomatidae
Order Caudata

OTHER NAMES. None.

DESCRIPTION. A somewhat stocky salamander, up to about 15 cm (5 inches) long, with a relatively small head and fat tail. Entire body blackish with fine light gray or white lines on the back sides, forming a reticulum or netlike pattern; pattern fainter dorsally; venter with small, disconnected light specks. Small grooves below nostril on upper lip absent. Larva broad-headed, bushy gilled; belly white, side with a single, narrow yellow or white longitudinal stripe, passing through a chocolate brown dorsal ground color. The light brown face has a thin dark brown stripe passing through the eye from the nostril to the gills. No other broad-headed salamander larva has conspicuous lateral stripes.

FIG. 35. Flatwoods salamander (Ray E. Ashton, Jr.)

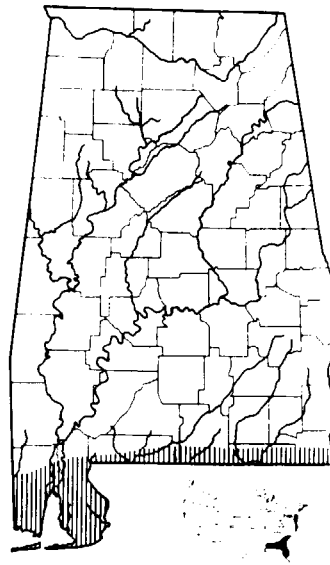
RANGE. Restricted to the southeastern U. S. Coastal Plain, from the southern half of South Carolina southward to Marion County in northern-central Florida, and westward at least to Mobile County, Alabama. In Alabama, the range is confined to the southernmost tier of counties (Mobile, Baldwin, Escambia, Covington, Geneva, and Houston), in the Lower Coastal Plain, although recent records are available only from Houston and Covington counties.

HABITAT. Pine flatwoods. Larvae are found in shallow cypress-gum ponds, flooded roadside ditches, and other such aquatic habitats in flatwoods. Adults live in the flatwoods surrounding breeding sites and may be dependent upon some microhabitat aspect of the wiregrass (*Aristida stricta*) - dominated groundcover for long-term survival.

LIFE HISTORY AND ECOLOGY. This species is one of only two members of its family that breed in the fall and lay eggs on land. Adults migrate to the breeding sites during rainy weather in October and November, before they fill with water, where they court. The females lay groups of 1-35 eggs (for a total of up to at least 225) at the bases of bushes, small trees, and clumps of grass, usually in the lowest parts of the depressions. Embryos begin developing immediately, but remain within the eggs until heavy rains fill the depressions, usually in December or January. Metamorphosis occurs in March and April. The post-larval life of the flatwoods salamander is totally unknown. Age at maturity, longevity, survivorship, and limiting factors are important aspects that need study.

BASIS FOR STATUS CLASSIFICATION. The entire range of this secretive species is small and few recent records are available from Alabama. Its pine flatwoods-wiregrass habitat is diminishing rapidly due to agriculture, silvicultural site preparation, and urban and suburban development. If the species is unable to survive in edificarian habitats, its prospects for long-term survival may be inversely related to the rate of disappearance of the natural groundcover of the low pine flatwoods habitat.

RECOMMENDATIONS. Not only should studies be undertaken to reveal important and possibly critical aspects of its life history and ecology, but a census of likely habitats in



Range of the flatwoods salamander.

Alabama should be made and efforts should be und
determine the full extent of the Alabama range. In
land management practices that favor maintenance
pine flatwoods-wiregrass habitats should be encou
recommended to the extent that they are economic
ble. However, the impact of "prescribed" winter
pine flatwoods, an artificial fire regime, should
gated, in as much as the salamander tends to be ne
face during winter.

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PREPARED BY: D. Bruce Means, Coastal Pl
tute, 1313 N. [illegible] St., Tallahassee, Florida 323

Birds vary widely with respect to their adaptability. The Common Crow, for example, is a "generalist" and can exploit a wide variety of food and habitat types. Such birds are better able to survive environmental changes. Conversely, a bird with restrictive ecological requirements is the Snowy Plover. It feeds only in the intertidal zone on remote offshore islands and does not tolerate human disturbance. This shorebird is a habitat specialist, sensitive to environmental alterations, and exemplary of a number that are prime candidates for extinction or extirpation.

Although disease, predation, and natural disasters can produce environmental changes capable of adversely affecting birds, habitat destruction and alteration by humans continue to be the greatest threats to the survival of Alabama birdlife collectively. Partial damage or even slight changes in the environment can cause immediate trouble for the habitat specialists. Adaptable species displaced because of habitat destruction or alteration may exploit nearby areas and compete with species that have more restrictive ecological requirements. Such population shifts may stress the habitats and ultimately affect their quality. Substantial increases in bird numbers often occur during the winter and summer, when migrants swell local populations. Resulting population pressures coupled with deterioration of habitat can jeopardize the survival of some species. "Quality habitat" throughout the year, for all stages of a bird's life cycle, is essential for the species' well-being.

In addition to the recommendations contained in the "Preface" and those included in the species accounts, the Committee on Birds recommends the following for all species:

1. Compile existing data on the biology, on historic and current range limits, including wintering grounds, migrational routes, and stops; and on any other aspect that would aid in identifying local critical habitats.

2. Derive estimates of population densities on a seasonal basis to help determine the magnitude of ecological stress placed on the habitat.

3. Determine the diseases, predators, and human-related factors that affect the species' well-being and assess the magnitude of their impacts.

4. Conduct habitat analyses and assess quality and quantity of habitat available.

5. Conduct environmental impact studies in the case of all proposed projects and changes in land use that could substantially affect the regional avifauna. The results could be used to preclude or to minimize adverse impacts that might occur otherwise and to enable us to exercise better stewardship of our land and water resources in general.

Dan C. Holliman

ALABAMA BIRDS NEEDING SPECIAL ATTENTION

Species	*Current Protection*
ENDANGERED	
Wood Stork	Federal (endangered status), State
Bald Eagle	Federal (endangered status), State
Sandhill Crane	Federal (endangered status[1]), State
Snowy Plover	Federal, State
Red-cockaded Woodpecker	Federal, (endangered status), State
Bachman's Warbler	Federal (endangered status), State
THREATENED	
Golden Eagle	Federal, State
Peregrine Falcon	Federal (endangered status), State
Bewick's Wren	Federal, State
SPECIAL CONCERN	
American White Pelican	Federal, State
Reddish Egret	Federal, State
Mottled Duck	Federal, State
Osprey	Federal, State
Cooper's Hawk	Federal, State
Merlin	Federal, State
Wilson's Plover	Federal, State
Piping Plover	Federal (threatened status), State
American Oystercatcher	Federal, State
Gull-billed Tern	Federal, State
Common Ground Dove	Federal, State
POORLY KNOWN	
Yellow Rail	Federal, State
Black Rail	Federal, State
Long-eared Owl	Federal, State
Northern Saw-Whet Owl	Federal, State
Alder Flycatcher	Federal, State
Willow Flycatcher	Federal, State
Warbling Vireo	Federal, State
Henslow's Sparrow	Federal, State
Le Conte's Sparrow	Federal, State

[1]This status designation applies to the Mississippi Sandhill Crane (see text).

Endangered

WOOD STORK

Mycteria americana Linnaeus
Family Ciconiidae
Order Ciconiiformes

OTHER NAMES. Wood Ibis, Flinthead.

DESCRIPTION. Wood Storks are large, long-legged birds with long, heavy bills. Head and upper neck lack feathers in the adult; the exposed skin gray-colored; body feathers white. Flight feathers and some coverts black with a blue-green sheen. Total length, 84-108 cm (35-45 inches) wingspread, to 167 cm (66 inches). Size about that of the Great Blue Heron but with a heavier body.

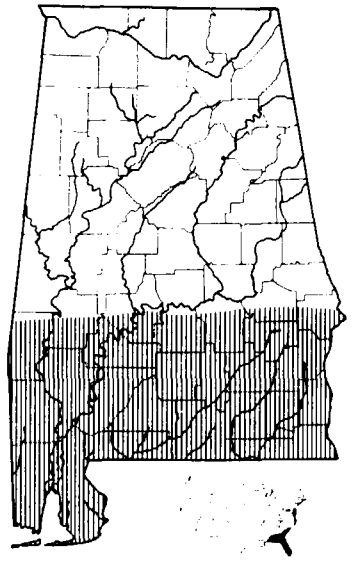
FIG. 62. Wood Storks (Julian L. Dusi).

RANGE. Originally bred in all of the Gulf Coast States and ranged into Central and South America. In the United States, it presently breeds in Florida, southeastern Georgia, and South Carolina, and disperses into Alabama and other states following breeding.

HABITAT. Wood Storks are wetland birds. They nest in tall cypress trees in swamps. Falling water levels in swamps, resulting in concentrations of fish, are important to their feeding.

HISTORY AND ECOLOGY: Colonial nesters, Wood Storks begin nesting in the northern portion of the range from February to April, with most of the young leaving the nests in June. After leaving they disperse throughout the Gulf States and up the Atlantic coast to Maryland, with some individuals going beyond.

They feed on small fishes that concentrate in shallow water by immersing the open bill and seizing any fish that touches it. They often soar and may travel long distances to feeding sites.



Range of the Wood Stork. Shaded area in Alabama is that in which the species is most likely to be sighted.

BASIS FOR STATUS CLASSIFICATION. Although the Wood Stork once nested in Alabama, it no longer does so. In Florida, the species' breeding is detrimentally affected by practices that interfere with normal fluctuation in surface water levels. It is believed that some losses result from shooting. THE WOOD STORK IS LISTED AS ENDANGERED BY THE UNITED STATES DEPARTMENT OF THE INTERIOR.

RECOMMENDATIONS. Monitor potential breeding in Alabama for possible breeding and monitor the population that disperse into Alabama. Support Wood Stork management in Florida. Education to reduce shooting death of storks and to reduce disturbance of the storks at nesting sites would be beneficial.

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PREPARED BY: Julian L. Dusi, Department of Zoology and Entomology, Auburn University, Alabama 36849.

Endangered

BALD EAGLE

Haliaeetus leucocephalus (Linnaeus)
Accipitridae
Falconiformes

OTHER NAMES. None.

DESCRIPTION. An extremely large bird, 71.0-
(28-32 inches) in length with a wingspread of 183-21
7 feet). Adults uniformly dark brown except for whi

FIG. 63. Bald Eagle (Bill Byrne, Massachusetts Div. Fish and

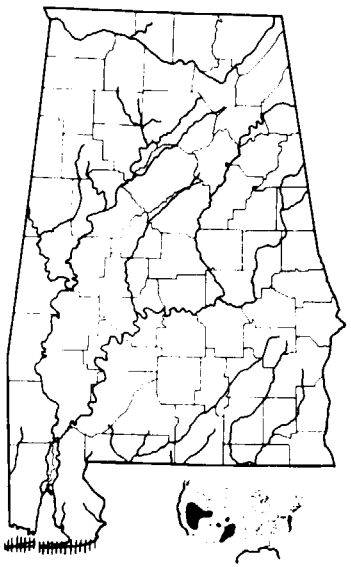
The Snowy Plover requires undisturbed, sandy beaches and, more so than most other creatures, its numbers are greater on islands. The Piping and Snowy plovers appear to be complementary sister species. The more cosmopolitan Snowy Plover is replaced in the northeast by the Piping Plover, which winters with it on the Gulf Coast where there appears to be no competition.

BASIS FOR STATUS CLASSIFICATION. In recent decades, the Snowy Plover's critical beaches have been subjected to excessive human activity. Some human recreation is not detrimental, but when a great many people take part or when the activity includes vehicles, the beach as a habitat for creatures, plant and animal, suffers.

Development of beaches is an even more serious threat because it is permanent. The building of houses, apartments, and other structures on the beach has become excessive.

RECOMMENDATIONS. Although legislation exists to limit the use of off-road vehicles, it is often violated and should be more vigorously enforced. The few remaining relatively pristine beaches in Alabama should be kept as natural as possible. Recreational use of beaches should be regulated to the extent practicable to avoid unnecessary disturbance of the fragile habitat. The public should constantly be reminded that the plant and animal life associated with the coast are important in making it attractive.

Ideally, no human intrusion at all is best for the Snowy Plover, especially during breeding. If possible, Sand and Pelican islands, the western portion of Dauphin Island, Fort Morgan, and some part of the Alabama Point area should be set aside as sanctuaries.



Range of the S over.

SELECTED REFERENCES

AMERICAN BIRDS. 1971-1983 (Audubon Field Notes, 1947-1970, Vols. 1-24) Vols. 25-37 Bi-Monthly; National Audubon Society; New York; four issues contain season reports, one the Christmas Count, all of which contain distributional data on the Snowy Plover.

CHAPMAN, F. M. 1966. Handbook of Birds of Eastern North America. Dover, N.Y. 581 pp.

HARRISON, C. 1978. A Field Guide to the Nests, Eggs, and Nestlings of North American Birds. Collins, Glasgow. 416 pp.

IMHOF, T. A. 1976. Alabama Birds, Second Ed. Univ. Ala. Press, Tuscaloosa. 445 pp.

PREPARED BY: Thomas A. Imhof, 1036 Pike Road, Birmingham, Alabama 35218.

Endangered

RED-COCKADED WOODPECKER

Picoides borealis (Vieillot)
Family Picidae
Order Piciformes

OTHER NAMES. None.

DESCRIPTION. The Red-cockaded Woodpecker is about the size of the Hairy Woodpecker, which it resembles except it has a zebra-like back, a black crown and a large white cheek patch. Male birds have a small red spot near the ear; otherwise the sexes are similar. Length 20 cm (8½ inches).

FIG. 66. Red-cockaded Woodpecker (Ed Tyberghein).

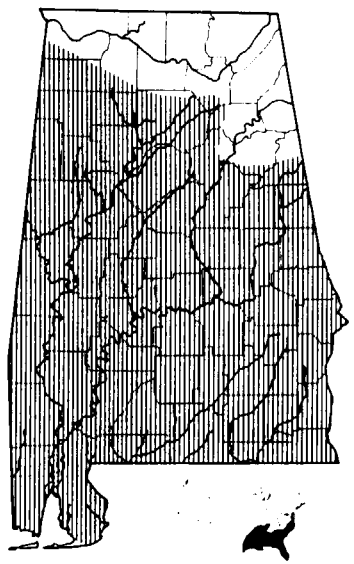
RANGE. This woodpecker is resident from eastern Oklahoma, Kentucky, and southern Maryland south to eastern Texas and southern Florida. In Alabama, it is found locally in most of the State south of the Tennessee River.

HABITAT. Red-cockaded Woodpeckers reside in pine woods. Requirements include living mature pi

ing dead hearts, within which the birds excavate their nest cavities. Optimal habitat has, in addition, interspersed stands of young pines, which provide good sites for foraging.

LIFE HISTORY AND ECOLOGY. Red-cockaded woodpeckers travel through open pine woods in small bands searching limbs, twigs, and cones for the insects that comprise the main portion of their food. Some seeds are also eaten. This species invariably nests in the aforementioned mature pines. The nest hole is dug into the center of the tree and angles upward until the dead heartwood is reached. The bird then digs straight down for about 30 cm (1 foot). Small holes are pecked above and below the nest entrance, allowing sap to flow and cover the surface around the hole and downward for about 1 m or so. The sticky surface apparently tends to repel such predators as snakes and flying squirrels. Two to 6 glossy white eggs are laid in the cavity. Old cavities are used for roosting.

BASIS FOR STATUS CLASSIFICATION. The culling of "substandard" trees and the increasingly extensive areas devoted to short-rotation forestry have greatly reduced Red-cockaded Woodpecker populations. Large pine trees with dead hearts are undesirable in the view of commercial foresters, and many have been removed. Many forest managers, knowing the endangered status of this species, now leave the nesting trees as well as a few large trees that surround them. At the present time, the extent of the area that should be left alone to enable a nesting colony to survive indefinitely is unknown. It has been estimated, however, that the home range size may approach 80 ha (200 acres). THE SPECIES IS CONSIDERED ENDANGERED BY THE UNITED STATES DEPARTMENT OF THE INTERIOR.



Range of the Red-cockaded Woodpecker.

RECOMMENDATIONS. Life history and habitat studi
on the Red-cockaded Woodpecker are underway throughc
the range. These studies are being coordinated through t
Endangered Species Office of the U. S. Fish and Wildl
Service. Until concrete information is available on the sp
cies' requirements, little can be done to assure that the pc
ulation can be brought out of danger. All corporate and in
vidual owners of large tracts of forestland should be ke
informed of current research and encouraged to set aside
few acres of trees surrounding Red-cockaded Woodpeck
nesting sites.

SELECTED REFERENCES

IMHOF, T. A. 1976. Alabama Birds. Second Ed., Univ. of A
Press, Tuscaloosa. 445 pp.

ROBBINS, C. S., B. BRUUN, AND H. S. ZIM. 1966. Birds
North America. Golden Press. N.Y.

U. S. FISH AND WILDLIFE SERVICE. 1976. Red-cockad
Woodpecker Recovery Plan. U.S. Fish and Wildl. Ser
Washington, D.C.

PREPARED BY: James E. Keeler, 3576 N. Georgeto
Dr., Montgomery, Alabama 36109

Endangered

BACHMAN'S WARBLER

Vermivora bachmani (Audubon)
Family Emberizidae
Order Passeriformes

OTHER NAMES. None.

DESCRIPTION. Length: 11.5 cm (4.5 inches). Ad
males with yellow forehead and chin and black cap a
throat, or bib. Amount of black in the cap and throat pa
varies. Upper parts olive-green and under parts yellow
cept for white undertail coverts. Adult females with yel
forehead, gray crown and cheeks, and prominent yellow
ring. Breast buff-colored or only slightly yellowish. B
adult males and females have noticeable yellow shoul
patch, not always stressed in field guides, which may h
useful field mark. Immatures buff below, brown above,
have whitish eye ring.

RANGE. Breeding has been recorded only in Alaba
Arkansas, Kentucky, Missouri, and South Carolina. The s
cies has also been recorded in Florida, Georgia, India
Louisiana, Mississippi, North Carolina, Oklahoma, and
ginia. The winter range is Cuba, including the Isle of Pi
The present distribution is unknown, and no populations
known.

HABITAT. Bachman's Warbler frequents, or formerly
quented, mature hardwood bottoms and headwater swa
where openings permit the development of second gro
vegetation. Apparently it does not inhabit swamps that
subject to flooding for extended periods of time. From
scriptions of 32 nesting habitats in the southern Coastal P
reported between 1897 and 1919, the plant communities
for nesting were swe swamp tupelo-red maple ass

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

EPA

I. IDENTIFICATION
01 STATE: AL | 02 SITE NUMBER: 0750455 75

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
DEGUSSA CORP., ALABAMA GROUP	THEODORE INDUSTRIAL PARK

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
MOBILE	AL	36590	MOBILE	097	01

09 COORDINATES LATITUDE: 30 31 30._ | LONGITUDE: 088 07 30._

10 DIRECTIONS TO SITE (Starting from nearest public road)
TAKE THE THEODORE EXIT FROM I-10E. TRAVEL W. ON OLD HIGHWAY 90 APPROX 2-3 MI. TURN LEFT AT THE STOPLIGHT AT HAMILTON BLVD. (ALSO KNOWN AS ISLAND RD.) AND TRAVEL ~3 MI TO STOP SIGN AND BEAR TO RIGHT ONTO RANGE LINE RD. CROSS THE BARBE CANAL AND TRAVEL 1 MILE TO PAVED ACCESS RD. ON RT. DEGUSSA IS 1ST ON RIGHT.

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)
DEGUSSA CORP., SHELL CHEMICAL	ROUTE 46 AT HOLLISTER RD.

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
TETERBORO	NJ	07608	(201) 288-6500

07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)
DEGUSSA CORP.	P.O. BOX 606

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
THEODORE	AL	36582	(205) 653-7933

13 TYPE OF OWNERSHIP (Check one)
☒ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☒ A. RCRA 3001 DATE RECEIVED: 11 / 18 / 80 (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: _____ (MONTH DAY YEAR) ☐ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☒ YES ☐ NO DATE 3 / 2 / 81 (MONTH DAY YEAR)
BY (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ☒ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)
CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)
☒ A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION
1974 (BEGINNING YEAR) | _____ (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
U211 - CYURANIC CHLORIDE WASTE
· ANALYTICAL LAB WASTE

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
LOW POTENTIAL HAZARD. THEY HAVE WITHDRAWN INTERIM STATUS AND ARE CONSIDERED A GENERATOR ONLY. ALL PHASES ON ENVIRONMENTAL INTERACTION ARE BEING MONITORED BY THE ADEM OFFICES (AIR, LAND AND WATER) DISPOSAL ACTIVITIES WELL DOCUMENTED.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☐ C. LOW (Inspect on time available basis) ☒ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
STEVE MAURER	ADEM	(205) 271-7729

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
DONALEA DINSMORE		EPS	(601) 922-8242	8 / 1 / 84 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

Doc. 2

1/52

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS *(Continued)*

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION *(Include name(s) of species)*

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES *(Spills/runoff/standing liquids/leaking drums)* — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

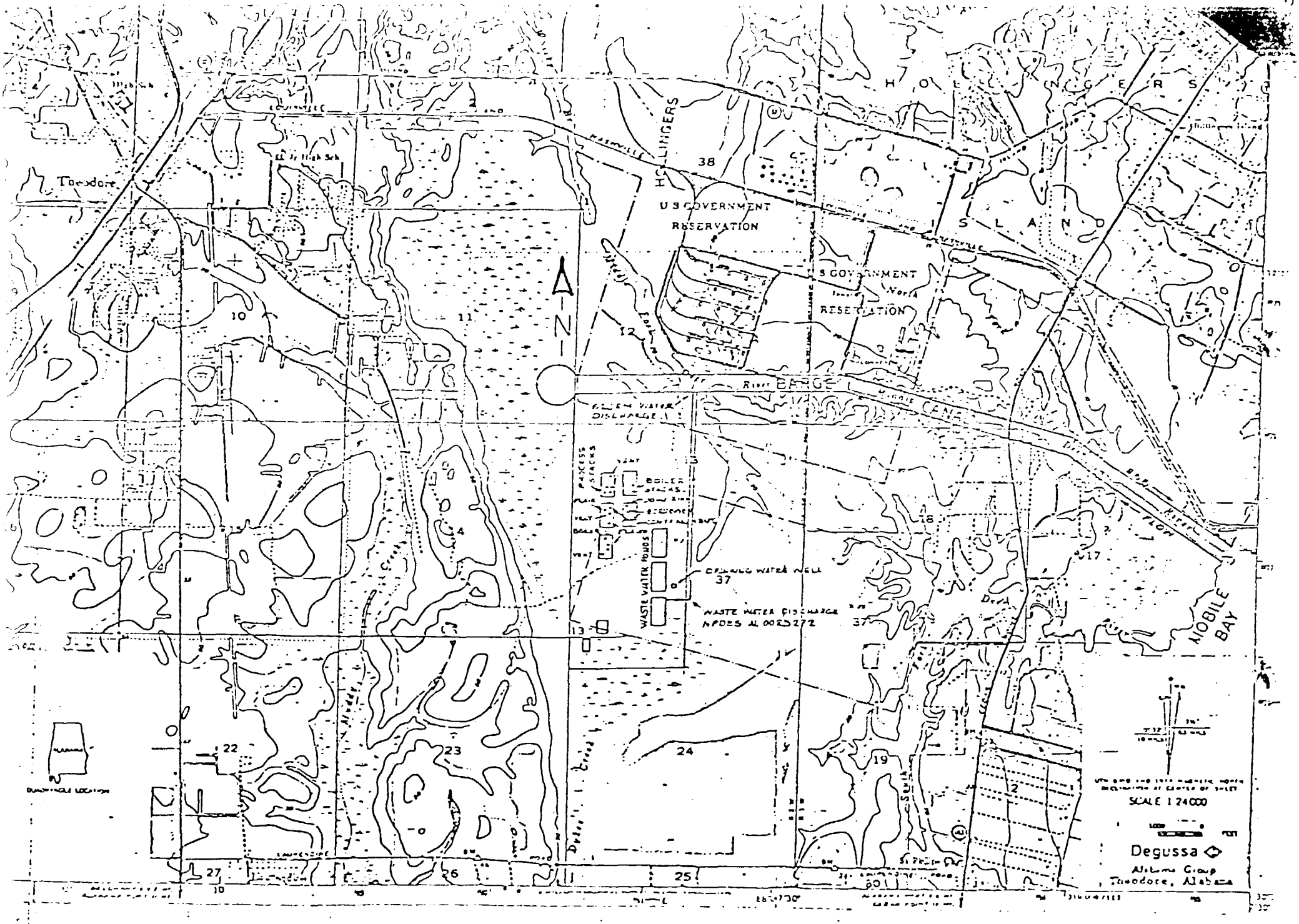
05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION *(Cite specific references, e. g., state files, sample analysis, reports)*

EPA FORM 2070-12 (7-81)


Theodore
HOLLINGERS
38
U S GOVERNMENT
RESERVATION
U S GOVERNMENT
RESERVATION
ISLAND
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BARGE
PROCESS STACKS
WASTE WATER PONDS
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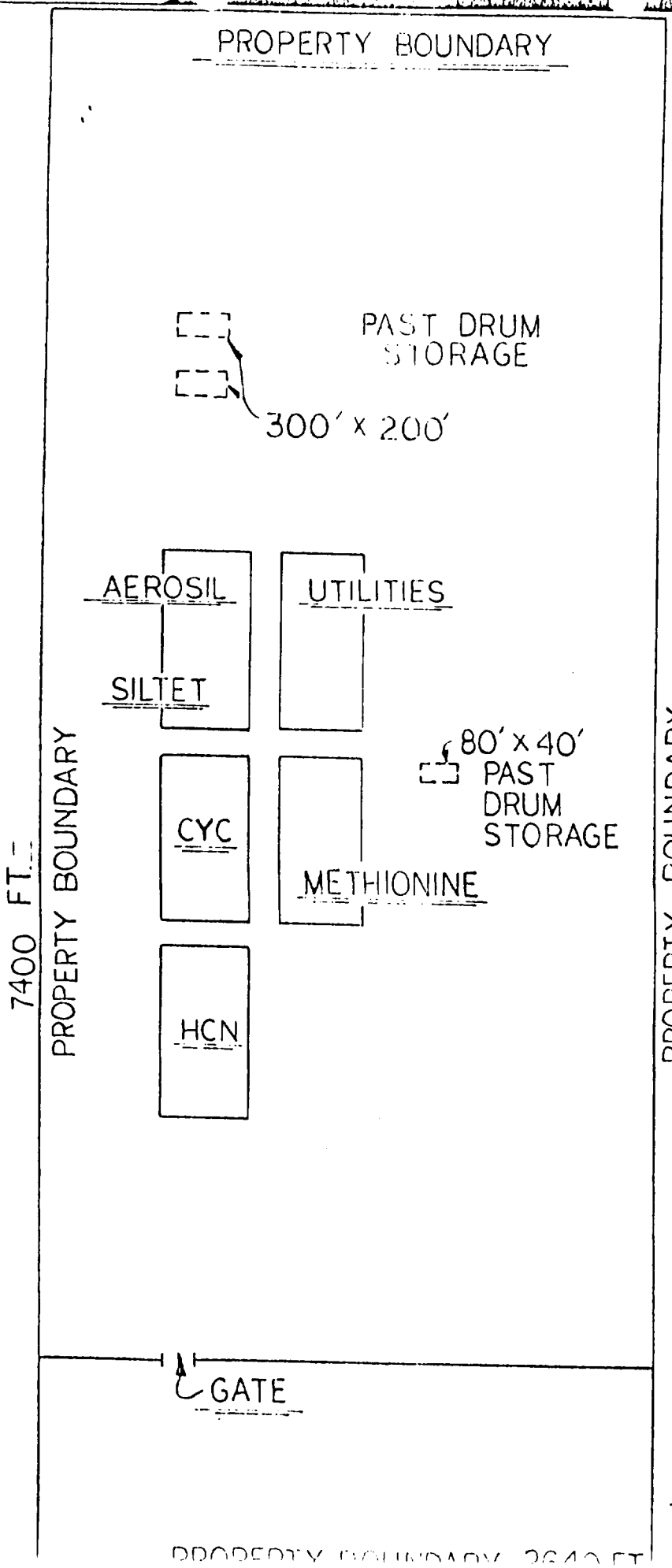
SCALE 1:24000
Degussa
Alabama Group
Theodore, Alabama

CILITY DRAWING *(see page 4)*

Form Approved OMB No. 158-S80054



SCALE: 1" = 660'-0"

LAND PROGRAM

19 83 Hazardous Waste Generators Annual Report

I. Facility ID # [A|L|D|0|7|5|0|4|5|5|7|5|]

II. Facility Name Degussa Corporation

III. Location of Facility Theodore Industrial Park P.O. Box 606
(Street or Route Number)

Theodore (City) Mobile (County) Alabama (State) 36590 (Zip Code)

IV. Installation Contact Gene Sheppard (Name) 205 (Area Code) 653-7933 (Telephone Number)

V. During 19 83 the facility did [ ] did not [X] generate reportable amounts of hazardous waste. (If you check did not, skip to Item VII.)

VI. Waste Identification:

	A. EPA Waste Number	B. Waste Description	C. Amount of Waste (lbs)	D. Receiving Facility	E. Receiving Facility ID Number	F. Transporter Name	G. Transporter ID Number
1.	D002, U211	CYC Lab Waste	600	Chemical Waste Management	ALD000622464	Ross Neely	ALD003796133
2.	D002	Cyanuric Chloride	20,380	Rollins Enviro. Svcs. LA, Inc.	LAD010395127	Rollins Env. Svc	LAD010395127
3.	N/A	Dowtherm/Kerosene	11,060	Rollins Enviro. Svcs. LA, Inc.	LAD010395127	Rollins Env. Svc	LAD010395127
4.	D003	CYC Sump Waste	3,940	Rollins Enviro. Svcs. LA, Inc.	LAD010395127	Rollins Env. Svc	LAD010395127
5.	N/A	MMP Sump Water	640	Rollins Enviro. Svcs. LA, Inc.	LAD010395127	Rollins Env. Svc	LAD010395127
6.	D002,U211	CYC Lab Waste	320	Rollins Enviro. Svcs. LA, Inc.	LAD010395127	Rollins Env. Svc	LAD010395127

VII. Certification:

Signature [signature] Gene Sheppard (Print or Type)

Title Environmental Superintendent

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

ATTACHMENT I

VI. Waste Identification Continuation Sheet:

	A. EPA Waste Number	B. Waste Description	C. Amount of Waste (lbs)	D. Receiving Facility	E. Receiving Facility ID Number	F. Transporter Name	G. Transporter ID Number
7.	D003	HCN Column Packing	800	Rollins Enviro Svcs. LA, Inc.	LAD010395127	Rollins Env. Svc	LAD010395127
8.	D003, U211	Carbontetrachloride (Cyanide solution)	48,660	Chemical Waste Management	TXD000838896	Disposal Systems Inc.	TXD000719518
10.							
11.							
12.							
13.							
14.							
15.							
16.							
17.							
18.							
19.							
20.							
21.							
22.							
23.							
24.							

ATTACHMENT TO: ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT LAND PROGRAM

1983 Hazardous Waste Generators Annual Report

1983

Non Hazardous Waste Activity

Degussa Corporation

Facility ID # ALD075045575

PRODUCT	WEIGHT (Lbs)	DISPOSER
Spent Activated Carbon Waste	286,000 lbs	Chemical Waste Management Emelle, Alabama
Furnace Ash Waste	215,040 lbs	Chemical Waste Management Emelle, Alabama
Potassium Carbonate	9,430,000 lbs	Rollins Environmental Svcs. Bayou Sorrell, Louisiana
Potassium Carbonate	4,996,000 lbs	Disposal Services, Inc. Deer Park, Texas

7/53

(Mobile Co)

Degussa

Degussa Corporation
P.O. Box 606
Theodore, Alabama 36590
Telephone 205-653-7933
Telex: 505514

December 19, 1983

Mr. Michael Smith
Division of Solid & Hazardous Waste
Department of Environmental Management
434 Monroe St.
Montgomery, Alabama 36130-1701

Dear Mike,

I have conducted an investigation into the complaint at the county landfill at Chunchula. The four bags filled with the white fluffy material contained a brand of Aerosil, which is a fumed silica product, imported from Degussa in Europe. This material is totally inert and not harmful to personnel at the landfill.

It is part of a shipment of 355 bags imported from overseas and stored in the Baldwin Warehouse. This material is sold for use by numerous industries throughout the South. This particular lot was damaged by water and disposed of at the landfill beginning September 29, 1983. Mr. Tony Dean, with Waste Pick-Up, who disposed of this material was advised that this material was harmless before handling this material.

I personally visited the Chunchula landfill and advised the equipment operators, and personnel on duty, that it was a form of Aerosil and was totally harmless to them.

Yours truly,

William H. Howard

William H. Howard
Chief Chemist
Environmental Dept.

WHH/cbt

9/5

Degussa

Degussa Corporation
P.O. Box 606
Theodore, Alabama 36590
Telephone 205-653-7933
Telex: 505514

September 15, 1982

Mr. Harold Taylor
Division of Solid and Hazardous Waste Management
434 Monroe St.
Montgomery, Alabama 36130-1701

Dear Harold,

We would like to request that furnace ash from Sil-Tet be removed from the list of hazardous waste materials generated by Degussa. This material was originally classified as EP Toxic because of the levels of chromium and barium in the leachate. In 1981 the test procedure for chromium was changed to hexavalent. Since only trace amounts of this is found in furnace ash, it no longer is over the limit for this parameter.

The analysis for barium conducted August 10, 1979 showed a 130 ppm level which was used to classify this material as EP Toxic. Since 1979 many analyses have been made. None of the samples have over 76 ppm barium, which is significantly below the 100 ppm limit. Results of analysis of samples collected from February 1981 to April 1982 is shown in the accompanying table.

We feel that these are sufficient data to establish that the barium levels in furnace ash are below the 100 ppm maximum set by the State and EPA. It is likely that the original 130 ppm value used to classify this material was an analytical error since it is the only sample in this concentration range.

About 140 tons a year of furnace ash are presently being disposed of at Emelle's Chemical Waste Management facility. With the delisting of this material it should prove of advantage economically to use the industrial landfill of EPC at Chunchula to reduce transportation costs should this disposal site be acceptable.

We look forward to hearing from you concerning the delisting of furnace ash and the acceptability of using the EPC landfill.

Sincerely,

William H. Howard

William H. Howard
Chief Chemist

WHH/cbt
Enclsoure

cc: Nick Suma

9/52

BARIUM IN LEACHATE FOR

FURNACE ASH

DATE	Ba (ppm)
Feb 29, 1980	48
Apr 16, 1980	76
Jul 16, 1981	22
Oct 6, 1981	33.8
Oct 13, 1981	37.6
Oct 20, 1981	20.2
Oct 27, 1981	63.7
Nov 3, 1981	54.8
Nov 16, 1981	45.8
Nov 30, 1982	65.8
Nov 9, 1981	74.4
Dec 16, 1981	30.9
Jan 21, 1982	17.3
Feb 16, 1982	17.0
Mar 1982 (composite)	45.0
Apr 1982 (composite)	40.8

Degussa Corporation

Alabama Group
P.O. box 606
Theodore, Alabama 36582
Telephone 205-653-7933
Telex 505514

May 26, 1982

Mr. John Poole, Jr.
Engineer, Technical Staff
Alabama Water Improvement Commission
Public Health Services Building
Montgomery, Alabama 36130

Dear John,

As per your telephone request in late March and your subsequent letter of March 31 in which you requested a list of facilities and substances stored or present which may spill and contaminate the storm water, we would like to offer the following:

METHIONINE AREA

1. Light fuel oil storage tank (drains through oil separator)

2. Sump for valve in hydrogen storage tank (storage of hydrogen gas - no contamination possible)

3. Sump in truck loading facility for liquimeth and waste potassium carbonate (recently permitted)

4. Liquimeth storage tankfarm (3 liquimeth storage tanks and 1 caustic storage tank - recently permitted)

5. Proposed MMP (methylmercaptopropionaldehyde) unloading and storage facility (truck loading sump and 3 storage tanks - engineering prints and preliminary engineering report attached)

UTILITIES

1. Heavy fuel oil storage tank (drain to storm sewer through oil separator.

AEROSIL

1. MTCS tankfarm (Methyltrichlorosilane - 1 tank)
2. HCL tankfarm (8 tanks)
3. Caustic tankfarm (5 tanks)

HCN

1. Acetone storage (1 tank)
2. H_2SO_4 storage (1 tank)
3. ABN storage (Aminoisobytryronitrile - 2 tanks)

CYC

1. Wastewater tankfarm #1001 and #1002 (2 tanks - 1 rain water and 1 process wastewater. Possible contaminants are HCN, Cyanuric Chloride, Ammonia and organics)
2. Solvent storage tank (1 tank containing Metachlorbenzotri-flouride)
3. Dowtherm storage tank
4. Dowtherm heater
5. HCN destruction area and tankfarm (consists of 4 HCN storage tanks, 1 HCN contaminated water vessel, 2 HCN destruction tanks, various pumps and compressors)

There are a number of other diked areas, both process and tankfarms which are drained only to Central Neutralization and discharged through our wastewater treatment system. In fact most of the tankfarms and diked areas listed above are presently also drained to our wastewater treatment system, but we would like the option of being able to discharge uncontaminated rain water directly into the storm sewer in the cases mentioned above.

As previously mentioned, I am enlcosing a number of prints and a preliminary engineering report for the proposed MMP (Methylmercaptopropionaldehyde) tankfarm which I have spoken to you about. If you have any questions on either of these matters please make me aware of same.

Sincerely,

Gene Sheppard
Environmental Supt.

GS/cbt
Enclosures

PRELIMINARY ENGINEERING REPORT

DEGUSSA CORPORATION

METHIONINE PLANT

METHYLMERCAPTOPROPIONALDEHYDE TANKFARM

THEODORE, ALABAMA

PREPARED FOR:

DEGUSSA CORPORATION

ALABAMA GROUP

THEODORE, ALABAMA 36590

PREPARED BY:

WHITE, LYNN, DUNCAN & ASSOCIATED, INCORPORATED

219 WEST ALABAMA STREET

FLORENCE, ALABAMA 36530

MAY, 1982

CERTIFICATION INFORMATION

WASTEWATER PERMIT APPLICATION - ALABAMA WATER IMPROVEMENT COMMISSION

A. NAME OF FACILITY - Methylmercaptopropionaldehyde tankfarm

B. TYPE OF FACILITY - Storage for unpurified methylmercaptopropionaldehyde and truck loading facility

C. DATE AND INITIAL OPERATION - September 1982

D. LOCATION OF FACILITY - Block E500, Degussa Corporation Plant Site
Theodore Industrial Park

E. NAME AND ADDRESS OF OWNER - Degussa Corporation
Alabama Group
P. O. Box 606
Theodore, AL 36590
Phone: (205) 653-7933

F. DESIGNATED PERSON RESPONSIBLE FOR PLANT - Dr. Sven-Peter Mannsfeld
President

G. MANAGEMENT APPROVAL - Full approval is extended by Management at a level with authority to commit the necessary resources.

SIGNATURE Sven-Peter Mannsfeld
NAME: Dr. Sven-Peter Mannsfeld

H. CERTIFICATION - I hereby certify that I have examined the proposed plans and information for a wastewater permit application to the Alabama Water Improvement Commission and find the plans in accordance with good engineering practice in meeting regulatory requirements for stormwater discharge from this storage and truck loading facility.

ALABAMA REGISTERED No. 9480 PROFESSIONAL ENGINEER JOSEPH ROBERT DUNCAN

SIGNATURE Joseph R. Duncan
NAME: Joseph R. Duncan, P.E.

REPORT OUTLINE

I. Introduction

II. Facility Description

III. Facility Units

- A. Tankfarm
- B. Truck Loading

IV. Water Supply

V. Sanitary Wastes

VI. Atmospheric Emissions

VII. Wastewater Collection and Treatment System

VIII. Schedule of Implementation

IX. Acknowledgements

PRELIMINARY ENGINEERING REPORT

DEGUSSA CORPORATION

METHIONINE PLANT

METHYLMERCAPTOPROPIONALDEHYDE TANKFARM

THEODORE, ALABAMA

I. INTRODUCTION

The Degussa Corporation, Alabama Group plans to construct a methylmercaptopropionaldehyde (MMP) tankfarm and truck loading facility at their plant site in the Theodore Industrial Park. This represents an expansion of the existing methionine plant to enable unpurified MMP to be trucked to the site, unloaded and stored in the tankfarm. It is planned to import unpurified MMP by ocean-going vessels from Europe. The containers will be unloaded at the Port of Mobile, placed on truck and transported to the plant site.

The Degussa Corporation plant site is located near the middle of the Theodore Industrial Park on a 400-acre tract bordered on the north by the barge canal extension of the Theodore Ship Channel (Figure 1). Figure 2 shows the layout of the plant site. The proposed facility will be located in Block E500 (Drawing E500 - C205) in proximity to the existing central neutralization, mother liquor storage (FA 901) and the recently completed liquimeth tankfarm. (Preliminary Engineering Report - Liquid Methionine Tankfarm, Feb. 1982). The proposed tankfarm will occupy a space 31' by approximately 89'. The truck loading station will be 41' long by about 32' wide.

II. FACILITY DESCRIPTION

The new truck loading station and MMP tankfarm proposed will not change the existing methionine plant process or alter any of the process characteristics. MMP is an intermediate chemical used in the production of methionine. Figure 3 shows the product flow for the existing MMP production and how the proposed facility will fit into the overall process flow scheme. In the existing MMP production methylmercaptan is reacted with acrolein to B-methylmercaptopropionaldehyde. The unpurified

MMP then goes through the purification unit and is held in pure MMP storage until it is used in the methionine production process. The new tankfarm will provide enough storage capacity of unpurified MMP (3.06 million gallons per year throughput/166,050 gallons of storage capacity) to furnish 2/3 of the intermediate feedstock requirements for the methionine process. This in effect will result in a reduction of MMP production at the plant site by 2/3, thereby reducing the vent gases from acrolein and methylmercaptan storage, and the main reactor by 2/3 that is vented to the John Zink Incinerator. The volume of MMP residue will not change appreciably. The residue from the purification process is burned in the incinerator. This procedure will continue and is covered in the existing air permits for this plant.

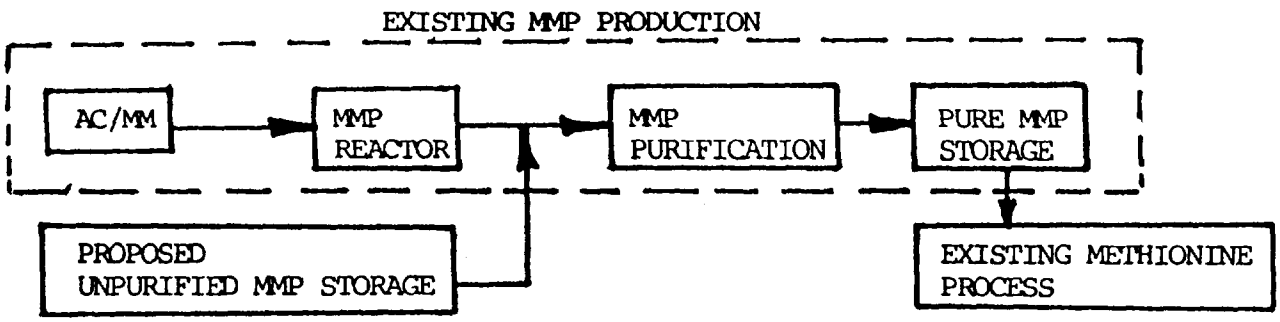


FIGURE 3: MMP PROCESS FLOW DIAGRAM

The tankfarm will operate 8 hours per day (day shift only), 7 days per week, 52 weeks per year. The truck loading station will operate periodically as containers are delivered. There will be no more than 50 containers per month. It is proposed to unload one container at a time with one (1) hour required for unloading.

III. FACILITY UNITS

This facility will be treated as two integral units - the MMP tankfarm and the truck loading station.

A. MMP TANKFARM

The tankfarm will contain three stainless steel tanks (FB-1530, 1531 and 1532) to store the unpurified MMP. All tanks will be vented through pressure relief

valves to the incinerator. Drawing 73/7892/0 shows the piping plan of the tank-farm. The tank area is diked by a five foot concrete wall to contain any overflow, accidental spills or retain contaminated stormwater. Drawing 73/21-0-019 shows the concrete foundation plans and details. The pump pad on the same drawing has a 6 inch curb with a sump to contain any leakage.

Any overflow or accidental spill from the MMP storage tanks will drain directly to the sump in the southwest corner of the diked area. The sump details are shown on Drawing 73/21-0-019. The sump pump (GA-1542) is a 5HP, 3500 RPM pump capable of pumping 83 gallons per minute. Any contaminated stormwater will be pumped to central neutralization, any accidental spill of MMP will be pumped to FA-901 tank and stored for disposal. (Piping is shown in Drawings 73/7892/0 and E500-C205). Stormwater, which collects in the concrete basin during a rain event will be checked for contamination. If uncontaminated, the collected rain water will be drained through the liquimeth tankfarm sump. Any pump leakage from the facility will be collected in the pump pad and flow through a 6 inch line to the front half of the sump in the diked tank area. This leakage would be pumped through the same sump pump (GA-1542) to FA-901 tank for disposal.

B. TRUCK LOADING STATION

A concrete pad about 41' by 32' will be used for unloading the MMP containers The pad will slope to 6 inch drain pipe for collection and containment of any leakage or accidental spill during unloading operations. This drain is connected to the front half of the sump in the diked tank area. Any leakage wash down of the pad or accidental spill would be pumped to the FA-901 tank. Any contaminated stormwater would go to the "Liquimeth" tankfarm sump for release to the stormwater drainage system.

During an 8 hour shift, a maximum of 8 container trucks can be unloaded. No more than 50 containers will be received per month. Shipments are expected on a weekly basis with about 12 containers per shipment.

IV. WATER SUPPLY

The water used at the Degussa Theodore site is treated water from the Mobile Water Service System. The proposed new facility does not add to the water supply requirements for this plant site.

V. SANITARY WASTES

Sanitary wastewaters from the shower and bathroom facilities are collected spearately from process wastewater and pumped to the Mobile sanitary sewer system within the Theodore Industrial Park. The proposed facility will not contribute to the sanitary wastewater needs at this plant.

VI. ATMOSPHERIC EMISSIONS

The vent gases from the unloading of the containers and the storage tanks are piped to the John Zink Incinerator (BN-1791). The piping is shown in Drawing 73/7892/0. As has been discussed in earlier parts of this report, there will be an overall reduction in the vent gases from the existing MMP production unit due to a decrease in the vent gases from raw material storage and the main reactor. Production of raw MMP will be reduced by 2/3 at the Theodore plant site, however, this does provide flexibility to increase the raw MMP if the future demand should dictate. Based on this change in the MMP process there will be a net reduction in emissions from the John Zink Incinerator.

VII. WASTE COLLECTION AND TREATMENT SYSTEM

The waste collection and treatment for the methionine plant consists of a combination of recycle, central neutralization and discharge of treated wastewater. The proposed facility affects only the mother liquor storage tank (FA-901), central neutralization, and the "Liquimeth" stormwater drainage system. The proposed facility does not affect any of the methionine process operation.

There are no other waste products associated with the operation of the proposed facility and this operation will not increase waste products from the other process units in the plant complex, with the exception of the storm drainage system. Storm

drainage from the non-process areas of the plant site is transported through concrete open channels and flow into the barge canal extension and through the Theodore Ship Channel. In addition to the check valves in the sumps in the diked areas, there is a final check valve in the drainage ditch running under the truck loading station. This consists of a 6 inch pipe through a concrete wedge poured in the drainage ditch adjacent the environmental office building. A manually operated valve is located on the outlet of the pipe and is used as a precaution in the event of a spill or detection of contaminated stormwater in the methionine plant area.

VIII. SCHEDULE OF IMPLEMENTATION

Completion of construction is scheduled for early September 1982. Operation is tentatively scheduled for late September 1982, pending issuance of the wastewater permit.

IX. ACKNOWLEDGEMENTS

Information pertaining to the facility descriptions, unit operations and wastewater characteristics have been provided by Degussa Corporation, Alabama Group. Those assisting were Gene Sheppard, Environmental Superintendent, Wolfgang Heim, Project Engineer, and Dr. Horst Wenz, Methionine Superintendent. The report was prepared by Joseph R. Duncan, P. E. under Degussa Purchase Order Number D-54199 M.

X. LIST OF DRAWINGS

The following drawings have been referred to in this report and are submitted as an attachment for reference purposes:

Drawing Number	Title
73/7892/0	MMP STORAGE AREA PIPING PLAN AND SECTIONS
73/21-0-019 Sheet 1-3	MMP TANKFARM/GENERAL OVERVIEW
73/21-0-019 Sheet 2-3	MMP TANKFARM CONCRETE FOUNDATIONS PLANS AND DETAILS
E500-C205	SITE/GRADING PLAN

Mobile Co.

State of Alabama

DEPARTMENT OF PUBLIC HEALTH

State Office Building
Montgomery, Alabama 36130

March 26, 1982

IRA L. MYERS, M.D.
STATE HEALTH OFFICER

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Gene Sheppard
Degussa Corporation
P. O. Box 606
Theodore, Alabama 36582

Dear Mr. Sheppard:

The purpose of this letter is to confirm recent telephone discussions between you and Mr. Mike Smith, of the office, concerning the disposal of carbonaceous filter material at the Schillinger Road landfill operated by Dirt, Incorporated.

As you are aware, a number of complaints have been received by this office concerning the disposal of the spent carbon filter material mentioned above. The waste, as it turns out, was generated by Degussa, transported by SCA and disposed of by Dirt, Incorporated.

As you are also aware, the Division of Solid and Hazardous Waste is in agreement with Degussa that the material in question is not a hazardous waste by current standards, but is rather an odoriferous waste which is causing a nuisance due to the proximity of the site to a residential area. Furthermore, due to the nature of the waste and the type of site operated by Dirt, Incorporated at Schillinger Road, the waste cannot be disposed of at that location. The site is for inert material only as specified in the Alabama Solid Waste Management Regulations, Section 4-181.08.

Because of the situation mentioned above, the Division must require that the material be located, removed and taken to an approved site within 14 days upon receipt of this letter.

Your immediate attention to this matter will be appreciated.

If you have questions or comments about this matter, please contact Mr. Mike Smith or me.

Sincerely,

Bernard E. Cox, Jr., Chief
Industrial and Hazardous Waste Section
Division of Solid and Hazardous Waste

BEC:MS:rc

cc: Lamar Harrison
Jerry Brackins

21/57

State of Alabama

DEPARTMENT OF PUBLIC HEALTH

State Office Building
Montgomery, Alabama 36130

IRA L. MYERS, M.D.
STATE HEALTH OFFICER

January 25, 1982

Mr. John Hananek
Degussa Corporation
P. O. Box 606
Theodore, Alabama 36582

Re: Theodore, Alabama: ALD075045575

Dear Sir:

This is to acknowledge receipt of your request to withdraw your Part A, RCRA Permit Application. Since Alabama has Phase I Authorization, it will be our responsibility to determine if your request should be honored.

Based upon the information you supplied, it appears that your facility is no longer treating, storing, or disposing of hazardous waste and is, therefore, not subject to Alabama's Hazardous Waste Management Regulations. Therefore, your request to withdraw your Part A Application is granted.

You should be aware that your request to withdraw interim status means that you may not treat, store, or dispose of hazardous waste without a permit issued under the authority of Code of Ala. 1975, Section 22-30-12, as amended, and the Regulations adopted thereunder.

Should you have questions or comments, please feel free to contact this office.

Sincerely,

B.E. Cox Jr.

Bernard E. Cox, Jr., Chief
Industrial and Hazardous Waste Section
Division of Solid and Hazardous Waste
Environmental Health Administration

BEC:rc

cc: Mr. James Scarbrough
EPA Region IV

22/52

ALABAMA STATE DOCKS DEPARTMENT AN AGENCY OF THE STATE OF ALABAMA
TWX 810 741 7748
P.O. BOX 1588
MOBILE, ALABAMA 36633

October 15, 1981

Mr. Harold W. Taylor
Environmentalist
Division of Solid & Hazardous Waste
Environmental Health Administration
Department of Public Health
State Office Building
Montgomery, Alabama

Dear Mr. Taylor:

For your ready review we are enclosing a copy of your letter of December 8, 1980 to Mr. William Howard. Mr. Gene Sheppard of Degussa Corporation has approached the Alabama State Docks Department requesting that the sludge referred to in your December 8, 1980 letter be placed on lands belonging to the Department. The area they have requested to use is a diked area presently used for the placement of dredge material from the maintenance of a nearby barge channel. Before replying to Degussa's request, I have several questions. I feel the following questions are ones which your department can answer for us.

1. Will the placement of this sludge material have a long term adverse environmental impact on the Department's property?

2. Will the placement of the material on the Department's property interfere in any way with the use of this area as a maintenance spoil disposal area for material from maintenance of either the adjacent barge or ship channel or with the discharge of water from the diked area?

3. What is the reason for the statement in the second sentence of paragraph two of your December 8th letter? Why would more than one be objectionable?

Your reply concerning the above will assist us in determining our answer to Degussa.

Very truly yours,

W. H. Black, Jr.
Chief Administrative
Officer

WHB/kb
Enclosure

23/52

P/A WD

000518

Degussa Corporation

Alabama Group
P.O. box 606
Theodore, Alabama 36582
Telephone 205-653-7933
Telex 505514

July 28, 1981

ALD 075 045 575

Mr. Paul C. Keith
EPA Region IV
RCRA Activities
345 Courtland Street
Atlanta, Ga. 30365

Dear Mr. Keith:

Enclosed is the letter of July 22 from your office and the original permit. As per our telephone conversation of July 28, I am requesting that the application of Form 1 and 3 be withdrawn. This request is in accordance with the fact that we are withdrawing our application to store hazardous waste on our plant site for more than ninety (90) days, and the fact that we no longer are classified as treating hazardous waste. Our operations only classify Degussa as a generator of hazardous waste.

Thank you for your attention to this matter.

Yours truly,

Bill Howard

Bill Howard
Chief Chemist

BH/ct

24/52

BEC

RECEIVED
JUL 10 1981
STATE [illegible] DEPARTMENT
DIVISION OF SOLID WASTE

File with EPA Inspection file

Degussa Corporation

Alabama Group
P.O. box 606
Theodore, Alabama 36582
Telephone 205-653-7933
Telex 505514

July 6, 1981

EPA Region IV
RCRA Activities
345 Courtland Street
Pensacola, Florida 30365

Gentlemen:

Enclosed is a revised application for hazardous waste activities. A number of deletions were made from the original application reflecting changes in EPA regulations or latest interpretations. Also, application for storage over ninety (90) days has been dropped.

Should there be any questions, please contact me.

Yours truly,

Bill Howard

Bill Howard
Chief Chemist

BH:mw

Enclosures

A I.D. NUMBER (enter from page 1)

X	L	D	0	7	5	0	4	5	5	7	5				W	DUP	2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D002	1500	P	S01	CYC Lab Waste
2	D009	60	P	S01	Analytical Lab Waste
3	D002	9000	P	S01	CYC
4	D005	240000	P	S01	Furnace Ash
5					
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21/53

State of Alabama

DEPARTMENT OF PUBLIC HEALTH

State Office Building
Montgomery, Alabama 36130

IRA L. MYERS, M.D.
STATE HEALTH OFFICER

June 22, 1981

M E M O R A N D U M

TO: Bernard E. Cox, Jr., Chief BEC
Hazardous & Industrial Waste Section

FROM: Harold W. Taylor, Jr., Environmentalist HWT
Hazardous & Industrial Waste Section

RE: Unauthorized Dump Near Rabbit Creek (Mobile County)

On June 9, 1981, Mr. Gary Allen, of AWIC in Mobile, called in reference to the above mentioned site. The substance was a powder material low in chlorides and high in sulfates with a pH of 6.5. There was a partial truck load dumped at the site. This writer contacted Mr. L. G. Linn who was in the area and asked him to pick up a sample.

On June 10, 1981, Mr. Bill Howard of Degussa, called and reported that he had investigated the site after seeing it on the nightly news. Mr. Howard reported the material to be ammonium sulfate and surmised that it might have been connected with his company's activities. Therefore, Degussa was assuming responsibility for the material and would have it removed immediately. He guessed the material may have been dumped by C M Middelton Trucking Company, perhaps to meet weight limits. He will investigate the matter and report his finding to our office.

HWT:hj

BEC
HWT

Degussa Corporation

Alabama Group
P.O. box 606
Theodore, Alabama 36582
Telephone 205-653-7933
Telex 505514

May 26, 1981

Mr. Harold Taylor
Alabama Division of Solid and Hazardous Waste
434 Monroe Street
Montgomery, Alabama 36130

Dear Harold,

Enclosed is a copy of John Herrmann's letter concerning the incinerators. He confirms that the hazardous waste regulations do not apply to our incinerators.

I am sending in a modified permit application to EPA to reflect these changes.

Yours truly,

Bill Howard

Bill Howard
Chief Chemist

BH/pls
Enclosure

28/52

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

MAY 21 1981

REF: 4AH-RM

Mr. Bill Howard
Degussa Corporation
P.O. Box 606
Theodore, Alabama 36590

Dear Mr. Howard:

The purpose of this letter is to verify our determination of the applicability of the hazardous waste regulations to incineration of off gases which contain methyl mercaptan, hydrogen cyanide, and acrolein. At this time, EPA does not consider stack emissions to meet the definition of solid waste.

The Resource Conservation and Recovery Act defines solid waste to be "any . . . refuse, sludge from a . . . air pollution control facility and any other discarded material including . . . contained gaseous material." EPA interprets "contained gaseous material" to include gaseous material which is containerized (in tanks or containers), where the primary purpose of the tank or container is to prevent mixing with the atmosphere. Conversely, EPA interprets a stack to be a conduit which has the primary purpose of mixing the stack gases with the atmosphere. Therefore, the emissions from your facility are not regulated under RCRA, but are subject to the applicable regulations promulgated under the authority of the Clean Air Act.

You have also requested clarification as to whether solid carbonaceous waste material, which in the past has on rare occasions spontaneously ignited, meets the definition of hazardous waste under §261.21(a)(2) (ignitability). As you mentioned, the testing protocol for the solid ignitable characteristic has not been finalized by EPA. In addition, the background document (excerpt enclosed) provides very little further clarification. The Department of Transportation regulations (49 CFR 172.101) do not list activated or spent carbon as a hazardous material. Therefore, based on the foregoing, EPA believes that under standard temperature and pressure, your solid carbonaceous waste would not be expected to ignite spontaneously. Although EPA recognizes that it is the generator's responsibility under §262.11 to determine whether a solid waste is also a hazardous waste, EPA would concur with your assertion that the solid carbonaceous waste material as described is not a hazardous waste.

Sincerely yours,

John P. Herrmann
Chemical Engineer

29/52

Degussa Corporation

Alabama Group
P.O. box 606
Theodore, Alabama 36582
Telephone 205-653-7933
Telex 505514

MAR 19 1981

STATE HEALTH DEPARTMENT
DIVISION OF SOLID WASTE

March 16, 1981

EPA Region IV
RCRA Activities
345 Courtland St.
Pensacola, Florida · 30365

Gentlemen:

I would like to request that one of the waste materials listed in our Form 3 be removed. The material in question is item number 9 on page 3 listed as shovel drier ash. Due to the change from total to Hexavalent chromium as per the November 12, 1980 rule of EPA, this material is found to contain chromium less than one tenth the specified limit. It therefore does not qualify as EP toxic.

Thank you for making this change in our application under ID number ALDO75045575.

Sincerely,

William H. Howard

William H. Howard
Chief Chemist

WHH/pls

cc: Mr. Harold Taylor
(Alabama Division of Solid and Hazardous Waste)

30/52

State of Alabama

DEPARTMENT OF PUBLIC HEALTH

State Office Building
Montgomery, Alabama 36130

IRA L. MYERS, M.D.
STATE HEALTH OFFICER

December 8, 1980

Mr. William Howard
Chief Chemist
Degussa Corporation
P. O. Box 606
Theodore, Alabama 36582

Dear Mr. Howard:

This letter is in response to your request of November 24, 1980, for disposal of sludge from your wastewater treatment lagoons in the barge canal spoils site of the Alabama State Docks.

The analyses submitted to our office reveal the material to be inert, non-hazardous and a candidate for land disposal. Our office does not object to a one-time disposal plan for this material as you have proposed, as long as the drainage is managed properly. It is our understanding that any drainage from the material will be collected and pumped back into your wastewater treatment facility, and therefore, eliminate any discharge from the spoils site.

Please submit to our office a written description of your disposal plans, including drainage control and projected dates for start and finish.

If there are any questions, please feel free to contact our office.

Sincerely,

Harold W. Taylor
Environmentalist
Division of Solid & Hazardous Waste
Environmental Health Administration

HWT:lsr

CC: Mr. John Poole
Alabama Water Improvement Commission

VESTER J. THOMPSON, JR., INC.
CHEMICAL, MATERIALS AND GEOTECHNICAL LABORATORIES
3707 COTTAGE HILL ROAD
MOBILE, ALABAMA 36609
TELEPHONE 205/666-2443

ORDER NO. 2305-79-632-CL

CLIENT'S NO. D26157M
D27166M

LABORATORY NO. 8650-8654

REPORT NO. 1

REPORT

September 11, 1979

REPORT OF: Analysis of Solid Wastes

REPORT TO: Degussa Alabama, Inc.
P.O. Box 606
Theodore, Alabama 36582

Attention: William H. Howard

Date Samples Submitted to Laboratory: 8/10/79

Sample Identification:		#1 Pond Sludge	#2 Dolomite Gangue	#3 Spent Carbon (Methionine)	#4 Spent Carbon (CYC)	#5 Shovel Drier Ash
Date of Analysis	Parameter	Lab No. 8650	Lab No. 8651	Lab No. 8652	Lab No. 8653	Lab No. 8654
8/22/79	Total Aluminum as Al, %	--	--	2.0	0.04	20.0
8/13/79	Total Arsenic as As, %	0.0001	0.012	0.00009	<.00005	0.0034
8/22/79	Total Barium as Ba, %	0.0067	0.020	0.010	<.005	0.037
9/7/79	Total Boron as B, %	--	--	0.002	--	--
8/22/79	Total Cadmium as Cd, %	<.0002	<.0002	<.0002	<.0002	<.0002
8/24/79	Total Calcium as Ca, %	10.6	0.060	0.046	0.0081	0.30
8/20/79	Chloride as Cl, %	4.47	0.65	--	--	27.5
8/21/79	Total Chromium as Cr, %	0.011	0.013	0.0077	0.0024	0.045
8/16/79	Total Cyanide as CN, %	<.00002	<.00002	<.00002	0.00009	--
8/23/79	Total Iron as Fe, %	1.1	3.4	0.38	0.092	8.2
8/22/79	Total Lead as Pb, %	<.001	<.001	<.001	<.001	<.001
9/4/79	Loss on Ignition @ 550 C, %	21.3	3.8	65.2	56.6	--
9/4/79	Loss on Ignition @ 800 C, %	23.5	63.6	65.4	85.1	--
8/24/79	Total Magnesium as Mg, %	13.5	2.3	0.050	0.0033	--
8/22/79	Total Manganese as Mn, %	--	--	0.010	--	--
9/4/79	Moisture Content, %	299	43	102	0.173	--
8/23/79	Total Nickel as Ni, %	--	--	<.001	--	--

3262

+ W. Degussa Corp.
(Poole Co.)

December 8, 1980

Mr. William Howard
Chief Chemist
Degussa Corporation
P. O. Box 606
Theodore, Alabama 36582

Dear Mr. Howard:

This letter is in response to your request of November 24, 1980, for disposal of sludge from your wastewater treatment lagoons in the barge canal spoils site of the Alabama State Docks.

The analyses submitted to our office reveal the material to be inert, non-hazardous and a candidate for land disposal. Our office does not object to a one-time disposal plan for this material as you have proposed, as long as the drainage is managed properly. It is our understanding that any drainage from the material will be collected and pumped back into your wastewater treatment facility, and therefore, eliminate any discharge from the spoils site.

Please submit to our office a written description of your disposal plans, including drainage control and projected dates for start and finish.

If there are any questions, please feel free to contact our office.

Sincerely,

Harold W. Taylor
Environmentalist
Division of Solid & Hazardous Waste
Environmental Health Administration

HWT:ler

CC: Mr. John Poole
Alabama Water Improvement Commission

33/53

BEC
11/8

Degussa Corporation

Alabama Group
P.O. box 606
Theodore, Alabama 36582
Telephone 205-653-7933
Telex 505514

November 24, 1980

Mr. Harold Taylor
Alabama Division of Solid and Hazardous Waste
434 Monroe Street
Montgomery, Alabama 36130

Dear Harold:

As requested, I am sending you the total and leachate analysis of sludge from the wastewater pond. We are requesting approval from the Alabama Division of Solid and Hazardous Waste to dispose of this material in the Barge Canal spoils site of the Alabama State Docks located adjacent to the Degussa plant site. There are approximately 50,000 cubic yards of this sludge which is composed of about 15% fused silica and 85% calcium and magnesium hydroxide and carbonates.

The spoils area covers approximately 90 acres. Engineering tests are being carried out to determine the effect of this material on the soil compaction.

We look forward to hearing from you concerning the land disposal of this material.

Yours truly,

William H. Howard

William H. Howard
Chief Chemist

WHH/pls
Enclosures

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VESTER J. THOMPSON, JR., INC.
CHEMICAL, MATERIALS AND GEOTECHNICAL LABORATORIES
3707 COTTAGE HILL ROAD
MOBILE, ALABAMA 36609
TELEPHONE 205/666-2443

ORDER NO. 2785-79-842-CL
CLIENT'S NO. D29055M
LABORATORY NO.
REPORT NO. 1

REPORT

December 13, 1979

REPORT OF: Extraction Procedure Tests of Solids Wastes

REPORT TO: Degussa Alabama, Inc.
P.O. Box 606
Theodore, Alabama 36582

Attention: Bill Howard

Sample Identification:	#1, Waste-water Pond	#2, Dolo-mite Slag	#3, Carbon Methionine	#4, CYC Carbon	#5, Shovel Drier Ash
Date Samples Submitted:	11/9/79	8/10/79	8/10/79	8/10/79	8/10/79
Lab No.:	0006	8651	8652	8653	8654
EXTRACTION TEST CONDITIONS					
Weight of Solid Phase Extracted, grams	100	100	100	100	100
Equivalent Volume of Liquid Phase, mls	0	0	0	0	0
Final Volume Extract, ml	2,000	1,600	2,000	2,000	2,000
Initial pH of Mixture	9.2	2.5	10.4	2.9	3.6
Volume of 0.5N Acetic Acid Required to Maintain Mixture at pH 5.0, ml	400(Max. Allowable)	0	128	0	0
ANALYSIS OF EXTRACT					
Total Arsenic as As, mg/l	< .01	<.01	<.01	<.01	0.11
Total Barium as Ba, mg/l	0.31	<.05	0.20	0.20	11
Total Cadmium as Cd, mg/l	<.002	<.002	<.002	<.002	<.002
Total Chromium as Cr, mg/l	0.050	0.028	0.11	0.46	6.3
Total Lead as Pb, mg/l	<.01	<.01	<.01	0.018	0.20
Total Mercury as Hg, mg/l	<.0002	<.0002	<.0002	<.0002	0.0003
Total Selenium as Se, mg/l	<.002	<.002	<.002	<.002	<.002
Total Silver as Ag, mg/l	<.01	<.01	<.01	<.01	<.01

Sample Identification:

Date of Analysis	Parameter	#1 Pond Sludge Lab No. 8650	#2 Dolomite Gangue Lab No. 8651	#3 Spent Carbon (Methionine) Lab No. 8652	#4 Spent Carbon (CYC) Lab No. 8653	#5 Shovel Drier Ash Lab No. 8654
8/17/79	pH	8.9	4.6	10.5	2.8	3.2
8/24/79	Total Potassium as K, %	--	--	4.1	--	--
9/5/79	Total Selenium as Se, %	<.1	<.1	0.28	0.21	<.1
8/24/79	Total Silicon as Si, %	5.5	21.8	9.2	0.079	5.0
8/21/79	Total Silver as Ag, %	<.001	<.001	<.001	<.001	<.001
8/24/79	Total Sodium as Na, %	2.0	0.15	0.73	0.072	0.095
8/24/79	Total Titanium as Ti, %	--	--	--	--	2.3

The preceding determinations are reported as percent based on the dry weight of the sample.

VESTER J. THOMPSON, JR., INC.

James C. Sciple

JCS/mar

21 Ltr

Cross File in EPC Mobile Co.
c.f. EPC

Degussa Corporation

Alabama Group
P.O. box 606
Theodore, Alabama 36582
Telephone 205-653-7933
Telex 505514

APR 24 19XX

STATE ... DIVISION OF ... & VECTOR CONTROL

April 23, 1980

Mr. Bernard Cox
Division of Solid Waste & Victor Control
Department of Public Health
State Office Building
Montgomery, Alabama 36130

Dear Mr. Cox:

With reference to your letter of February 25 concerning disposal of shovel drier and furnace ash, negotiations are underway with Rollins Environmental, Chemical Waste Management, and Environmental Pollution Control to dispose of the furnace and shovel drier ash wastes in a secure landfill. In the past, these materials have been stored on the north lot of our plant site. The accumulated shovel drier ash was repackaged in new 55 gallon drums and transported to Rollins Environmental's secure landfill in Louisiana for disposal.

The furnace ash, up to now, has been stored in wooden crates located in the north lot. Some of the crates disintegrated and spilled ash on the ground during cleanup operations. However, to assess any potential problems, levels of barium and chromium in a soil composite were tested and found to be several orders of magnitude below RCRA guidelines as determined by leachate analyses. Samples of runoff water from the area have barium and chromium levels well below drinking water standards set by EPA.

As soon as final details can be worked out, the wastes will be collected in bulk containers prior to disposal in a secure landfill. A new concept of fixing these wastes in

37/52

cement is being explored with EPC. Should this technique meet standards for safe disposal, we hope that these wastes can be handled in the Mobile County site operated by EPC. We will keep you advised of developments in this area as they arise.

Please contact me should there be any questions regarding this matter.

Very truly yours,

Bill Howard

Bill Howard
Chief Chemist

BH/pls

+/w Degussa (Mobile Co)

February 25, 1980

Mr. Bill Howard
Chief Chemist
Degussa Corporation
P. O. Box 606
Theodore, Alabama 86582

Dear Mr. Howard:

With regards to your letter of February 15, 1980, it appears that some potential problems exist with the waste generated at the Degussa plant in Theodore. Specifical the waste streams from the shovel drier ash and the furnace ash exceed the proposed limits for both barium and chromium as outlined on page 58956 of the proposed Federal Hazardous Waste Regulations.

It is the opinion of this agency that material of this type must go to a secure site for disposal. Therefore, we are including a partial listing of the secure sites in this area. In addition, we are requesting that you notify us as to the previous disposition of the shovel drier ash and the furnace ash so we can determine if proble exist with the present disposal practices.

Should you have any questions, please feel free to contact this office.

Youre very truly,

Bernard E. Cox, Public Health Engineer
Division of Solid Waste & Vector Control
Environmental Health Administration

BEC:bw

Enclosure

39/52

Degussa Corporation

Alabama Group
P.O. box 606
Theodore, Alabama 36582
Telephone 205-653-7933
Telex 505514

February 15, 1980

Mr. Wade Pitchford
Department of Public Health
State Office Building
Montgomery, Alabama 36130

Dear Mr. Pitchford:

Enclosed is information concerning the waste streams at the Degussa Alabama plant as you requested. A description of the characteristics and quantities generated are listed in Table 1. Chemical analyses are shown in Table 2 and 3 for the solid and liquid wastes. Although in some cases these analyses are on composites taken over a period of several days, they could be subject to change resulting from raw material and/or production variables. Leachate analyses as per 43FR58946 Section 250.13 are listed in Table 4.

Plans are now underway to comply with disposal of these materials in accordance with the guidelines set forth in the Resource Conservation and Recovery Act of 1976.

Please contact me should there be any questions concerning these data.

Yours truly,

Bill Howard

Bill Howard
Chief Chemist

BH/pls
Enclosure

TABLE 1

WASTE STREAM INVENTORY

MATERIAL	CHARACTERISTICS	QUANTITY GENERATED
Pond Sludge	Loose Precipitate	200 cu. yds./mo.
Dolomite Gangue	Soft-Flaky	40 cu. yds./mo.
Spent Carbon (Methio-nine)	Granular Solid	22,000 lbs./mo.
Spent Carbon (CYC)	Pelletized Solid	4,000 lbs./mo.
Shovel Drier Ash	Fine Powder	1,600 lbs./mo.
Sil-Tet Furnace Ash	Granular Solid	20,000 lbs./mo.
Aerosil Floor Sweepings	Soft Powder	3 cu. yds./mo.
Potassium Carbonate	Dense Liquid-Strong Odor	1,000 Tons/mo.
John Zink	Liquid-Strong Odor	Incinerated (250 tons/m
Machinery Oil	Dark Oil	75 gal./mo.

TABLE 2

ELEMENTAL ANALYSIS OF SOLID WASTES

PARAMETER	POND SLUDGE	DOLOMITE GANGUE	CARBON (METHIONINE)	CARBON (CYC)	SHOVEL DRIER ASH	FURNACE ASH	FLOOR SWEEPI (AEROS
Al	- (%)	- (%)	2.0(%)	.04(%)	20.0(%)	1.6(%)	5.1(%)
As	.0001	.012	.0009	<.0005	.0034	<.01	<.01
Ba	.0067	.020	.010	<.005	.037	.26	.031
Cd	<.0002	<.0002	<.0002	<.0002	<.0002	<.001	<.001
Cr	.011	.013	.0077	.024	.045	.61	.017
Cl	4.47	.65	-	-	27.5	10.1	.0095
Fe	1.1	3.4	.38	.092	8.2	7.6	2.4
Si	5.5	21.8	9.2	.079	5.0	25.3	10.9
SiO_2	-	-	-	-	-	54.2	23.3
Se	<.1	<.1	.28	.21	<.1	<.1	<.1
Ag	<.001	<.001	<001	<.001	<.001	<.005	<005
Ti	-	-	-	-	2.3	.046	.29
pH	8.9	4.6	10.5	2.8	3.2	4.2	8.8

TABLE 3

CHEMICAL ANALYSIS OF LIQUID WASTES

PARAMETER	POTASSIUM CARBONATE
pH	8.8
Methionine	9%
Cyanide	Less than 6 ppm
Potassium Carbonate	18%
Potassium Acetate	5%
By-Products	12%
Water	56%

PARAMETER	JOHN ZINK
Polymer Residue of Methylmercaptan/Acrolein	62%
Organics (By-Products)	6%
Water	31%

TABLE 4

LEACHATE ANALYSIS

PARAMETER	POND SLUDGE	DOLOMITE SLAG	CARBON (METHIONINE)	CARBON (CYC)	SHOVEL DRIER ASH	FURNACE ASH	FLOOR SWEEP (AERO
As	<.01mg/l	<.01mg/l	<.01mg/l	<.01mg/l	<.01mg/l	<.01mg/l	<.01
Ba	.31	<.05	.20	.20	11	130	.20
Cd	<.002	<.002	<.002	<.002	<.002	<.002	.014
Cr	.050	.028	.11	.46	6.3	68	.015
Pb	<.01	<.01	<.01	.018	.20	<.01	<.01
Hg	<.0002	<.0002	<.0002	<.0002	.0003	<.0002	.000
Se	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Ag	<.01	<.01	<.01	<.01	<.01	<.01	<.01

(Mobile Co.)

July 23, 1979

Degussa Corporation
Alabama Group
P. O. Box 606
Theodore, Alabama 36582

ATTENTION: Mr. Gene Sheppard

Dear Mr. Sheppard:

This is to confirm the meeting of July 13, 1979, at which a discussion was held on the waste management practices of Degussa Corporation at Theodore with Mr. John Hines, EPA, Mr. Dan Cooper, P. E., Deputy Director of The Division of Solid Waste and Vector Control, and the writer. As was pointed out to you, the recently enacted Alabama Hazardous Wastes Management Act of 1978 will regulate all phases of hazardous waste management, including storage, transporting, treatment and disposal. We have enclosed a copy of the Alabama Act, the Resource Recovery Act of 1976 and Proposed Guidelines and Regulations and Proposal on Identification and Listing of Hazardous Waste pursuant to the Resource Conservation and Recovery Act for your information and use.

In view of existing Laws and proposed Regulations, we request that you submit an analysis, specific quantities and characteristics of each waste stream generated at your Theodore plant site. This will enable us to work with you in developing an acceptable plan for the management of each waste stream.

A review of our files indicate that we have approved the Irvington landfill for the disposal of "Dolomite Gangue" from your plan, however, this was done under the condition that an analysis of the dolomite gangue from your Theodore plan be submitted for review. Since this analysis was not received by our office, we request that you include this waste stream in the above request.

If you have any questions concerning this letter, please give us a call.

Sincerely,

Wade Pitchford, Public Health Engineer
Division of Solid Waste & Vector Control
Environmental Health Administration

copy of Aug 4 '78 letter sent with this letter

WP:bw

Enclosures

45/52

DOLOMITE GANGUE

COMPONENT	%WEIGHT
$MgCa(CO_3)_2$	39.2
Fe_2O_3	1.2
Al_2O_3	1.6
SiO_2	5.4
H_2O	41.4
NaCl	0.2
$CaCl_2$	5.9
$MgCl_2$	5.1
	100.0

The physical properties of the waste are:

Apparent density: 110 lbs/ft^3

Mass: from 12,000 to 30,000 lbs per stream day
Volume: from 110 to 280 ft^3 per stream day (from 4 to 10 yd^3 per stream day)

State of Alabama
Department of Public Health
State Office Building
Montgomery, Alabama 36130

IRA L. MYERS, M. D.
STATE HEALTH OFFICER

July 23, 1979

M E M O R A N D U M

TO: Mr. Alfred S. Chipley, Director
Division of Solid Waste & Vector Control
Environmental Health Administration

FROM: Mr. Wade Pitchford
Division of Solid Waste & Vector Control
Environmental Health Administration

SUBJECT: Degussa Inc., Theodore Industrial Park
Mobile County

On Friday, July 13, 1979, the referenced chemical plant was visited by Mr. John Hines, EPA, Cooper and Pitchford, of this office. The purpose of the visit was to accommodate EPA to preselected plant sites. EPA selected plants visited by reviewing SIC codes and other information submitted by various agencies.

Mr. Gene Sheppard guided us around the plant and pointed out various waste streams as denoted on attached Plant Solid Waste List. The Dolemite Gangue (CYOL) was approved for disposal at the Irvington Landfill by letter August 4, 1978. All other wastes listed have not been approved by this office for disposal as far as can be determined by researching our flies.

The diked area for storage is of concern since 1. S.L-Tet Furnace Ash is placed in open drums in this area and allowed to hydrolize, giving off acid fumes. Most of drums are deteriorated and contents are on the ground. 2. Additional solid waste are stored here. We do not know the makeup of this waste.

The soils in this area are characterized by sands and high water table which casts questions concerning the storage area.

47/52

III.

A. Name: Degussa of Alabama, Inc.

B. Problem: Improper Waste Management

C. Background: In July, 1979, representatives of EPA and the Division of Solid Waste and Vector Control visited Degussa of Alabama, Inc., located in Theodore, Alabama. The purpose of the visit was to obtain waste type information and determine the disposition of the plant's waste products. It was discovered that waste products are stored in 55-gallon drums in a diked area to the rear of the plant. Many of the drums are in a deteriorated condition and their contents have spilled onto the ground. The problem is compounded by the fact that the area is characterized by sandy/clay soil and a high water table. The composition of the waste is uncertain at present; however, this Division has requested that Degussa supply a chemical analysis of each waste product that it generates.

D. Location: Degussa of Alabama, Inc., is located in Mobile County, Alabama, near Theodore in the Theodore Industrial Park.

E. Waste Type Information:

Uncertain at present; however, Degussa produces aerosol, methionine, cyanuric chloride, and hydrogen cyanide.

F. Status: The chemical analyses of Degussa's wastes are expected to be completed and furnished to this office shortly.

G. Point of Contact:

Mr. Gene Sheppard
Degussa Corporation
P. O. Box 606
Theodore, Alabama 36582
(205)653-7945

C/F Mobile Co
Irvington LF

I/W Degussa
Mobile Co.

August 4, 1978

Mr. Bruce Bernard
Hazardous Waste Manager
Browning-Ferris Industries
of Alabama, Inc.
Waste Systems Division
31st Avenue, Alabama 35204
8 Nam

Dear Mr. Bernard:

This is in reply to your letter dated June 12, 1978, requesting information as to the possibility of disposing of wastes generated from Degussa Alabama, Inc., Theodore. We understand that the wastes anticipated for disposal at the Irvington landfill (Mobile County) are supposingly representative of the enclosed analysis sheet headed "Dolomite Cangue".

After reviewing the wastes involved, this office approves the Irvington landfill for disposal of the above wastes provided that the Mobile County Health Department concurs. We point out that any necessary arrangements for disposal must be made with Mobile County.

This office has also been in contact with Mr. Bobby Marcet, of Degussa Alabama, Inc. and were informed that the analysis at hand is of wastes generated through a similar process at the Degussa plant in Germany. We have requested that a lab analysis be made of the specific Mobile Plant wastes, and that this office be furnished of the results for review. It is our understanding that it will be three to four weeks before future wastes will be available for analysis. At that time, the waste stream will be re-evaluated to determine a safe method for disposal.

49/-

If you have any questions regarding the above or if we can be of further assistance to you, please feel free to contact this office.

Sincerely,

Alfred S. Chipley, Director
Division of Solid Waste & Vector Control
Environmental Health Administration

ASC:clr

CC: Mr. James E. Fibbe
Mobile County Health Department w/enclosures

Mr. Mark Pool
Mobile County Health Department w/enclosures

Mr. Bobby Marcet
Degussa Alabama, Inc., w/enclosures

Mr. Roy Howard
P. O. Box 1443
Mobile, Alabama w/enclosures

July 13, 1979

PLANT SOLID WASTE LIST

Normal Plant Trash (i.e. paper, boxes, lumber, crates)

Collected in 30 cu.yd. containers and hauled by a contractor to the Mobile County landfill.

Methionine Activated Carbon

Carbon is collected in 20 cu.yd.containers and is hauled by a contractor to the Mobile County landfill. Waste was tested and approved for normal sanitary landfill disposal.

Cyol Plant Trimmerizer Carbon

This carbon was tested and accepted for approved landfill disposal. Special containers are provided for transport by a contractor who also transports the material to an approved landfill area.

Cyol Dolemite Gangue

Composition is calcium-magnesium compound precipitates. Waste has been approved for sanitary landfill disposal. Material is collected in 20 cu.yd. containers and is hauled by a contractor to the Mobile County landfill.

Effluent Pond Sludge

Composition is silica and precipitates of calcium-magnesium carbonates. Plans are to pump this sludge to the pre-neutralization unit for dewatering in a rotary vacuum filter. The filter cake will be tested and disposed of in the county landfill. Material is classified as inert. Leachate testing is being conducted to insure that the material poses no problems in the landfill.

Sil-Tet Furnace Ash

This ash is from the reaction of 96% - 98% silicon ore to silicon tetrachloride. This ash is composed of iron, aluminum and titanium metal with traces of $SiCl_4$. A hydrolizing system is part of the plant design, but is not sufficient to totally hydrolize the material. The partially hydrolized ash is put into drums and stored until it is totally hydrolized. It is then tested and put into an approved landfill. Plans are to develop and install a complete, one-step hydrolysis system that deposits the inert material in a container for transport to a landfill.

Sil-Tet Shovel Dryer Sludge

This sludge is completely hydrolized; contains aluminum, iron and titanium hydroxides. Quantity of this material is quite small and is collected in drums until a sufficient quantity is collected to send to an approved landfill. When the Furnace Ash System is installed, sludge will be included with the ash.

Additional solid waste occurs from time to time. When this happens, the material is placed in containers appropriate for the material and it is stored with a retaining dike around it. Material is then tested. If it is non-hazardous and approved by the county, a contractor is called in to transport the material to the county landfill. If the material cannot be put into the landfill without treatment, a waste management firm is called upon for recommendations. A contract is then issued to a reliable waste management firm for transport and disposal of the materials at an approved landfill.

as can be seen from Fig. 5. The first compartment is of steel lined with firebrick and is the combustion space for oil or fuel gas furnishing hot combustion gases at 1100°F. These hot gases are led through heat- and

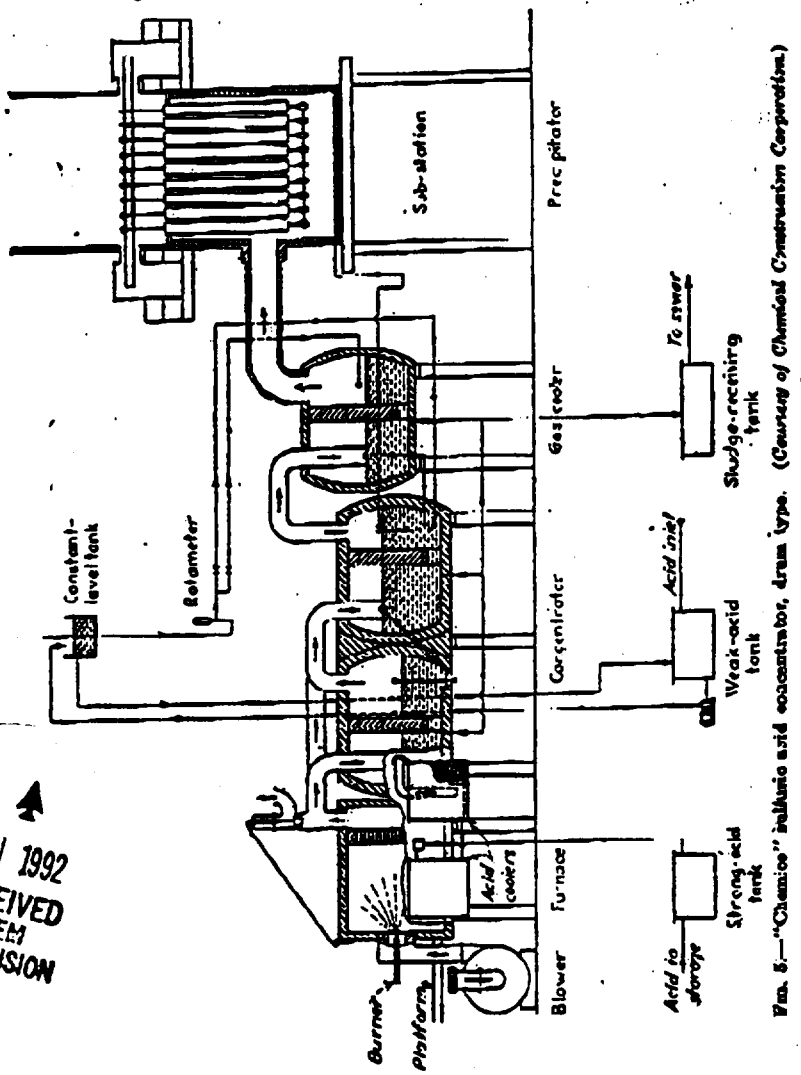

FIG. 5.—"Chemico" sulfuric acid concentrator, drum type. (*Courtesy of Chemical Construction Corporation.*)

acid-resistant iron pipes from one compartment to the other, being released slightly below the acid surface. The temperature of the gases entering the front concentrating compartment is around 1100°F., and

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as can be seen from Fig. 5. The first compartment is of steel lined with firebrick and is the combustion space for oil or fuel gas furnishing hot combustion gases at 1100°F. These hot gases are led through heat- and

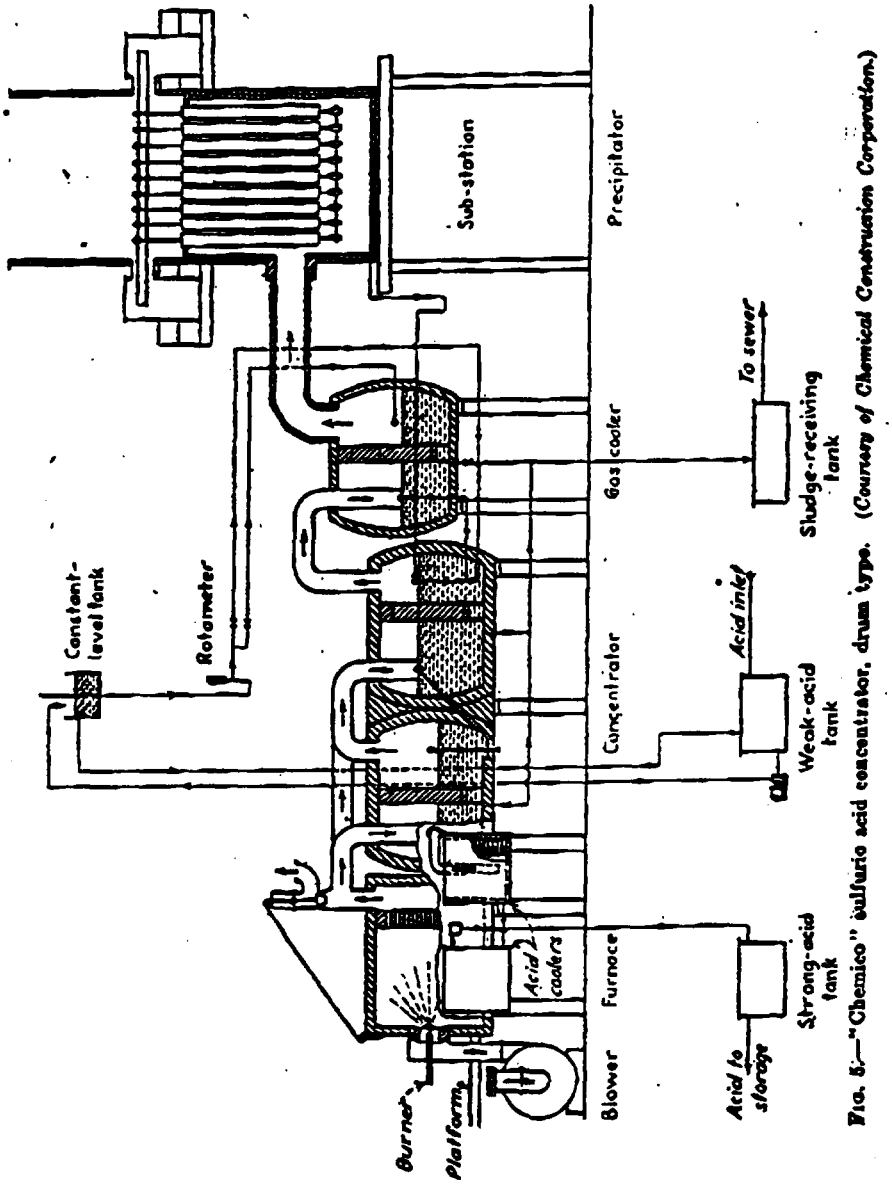

FIG. 5.—"Chemico" sulfuric acid concentrator, drum type. (Courtesy of Chemical Construction Corporation.)

acid-resistant iron pipes from one compartment to the other, being released slightly below the acid surface. The temperature of the gases entering the front concentrating compartment is around 1100°F., and

around 450°F. when leaving to enter the middle compartment. Through this middle compartment is also bubbled part of the hot combustion gases. The temperature when leaving the rear compartment and entering the duct to the Cottrell precipitator is around 200 to 250°F., when concentrating the acid to 66°Bé. This represents excellent thermal efficiency for this kind of concentration. The hot gases also burn out any dangerous impurities that may be in a spent acid being concentrated. Hence such concentrators are being extensively employed in the concentration of spent nitrating acids from munition works. Normally the acid to be concentrated flows continuously and without interruption from rear to front where it is cooled and discharged around 92 to 95 per cent sulfuric acid. However, if sludge acid from petroleum purification is being handled, the flow of acid from rear to front compartment is passed through an intermediate storage tank where a skimmer removes most of the nonvolatile carbonaceous impurities. The front and rear concentrating compartments of the steel drum are lined with lead and acidproof masonry. The repairs are remarkably low. Inside each drum of Fig. 5 is shown a vertical baffle to minimize the mechanical carry-over of acid mist and to lessen the burden on the Cottrell precipitator.

A tower[1] concentrator has also been used wherein the weak acid flows down against the rising hot gases from a combustion chamber. No new tower concentrators have been built for many years.

The steam-heated vacuum concentrators are exemplified by the Simonson-Mantius vacuum concentrator and the Chemico flash film concentrator. The former is a batch type and is presented in Fig. 6. It employs, particularly at the end of a batch, a *high vacuum* (29.8 in.) to reduce the boiling point of the sulfuric acid. It is a cleanly operating and efficient equipment. Dr. Otto Mantius[2] states, "Charges for maintenance and repairs for larger units will be about 20 cents per ton of acid produced, for smaller plants about 30 cents." To get 93 per cent acid from 78 per cent, 1,400 lb. of 100-lb. steam are required, basis 1 ton of 100 per cent acid. This 1,400 lb. of steam includes both the heating steam and that required for vacuum maintenance; this however does not include the steam required for initial heating of weak acid to boiling point. The concentrator itself is a steel shell lined with lead and acidproof brick. The central brick supporting column is not necessary for concentrators of 12 ft. and smaller diameter. The inward protruding closed end heating tubes are made of Duriron or other sulfuric-acid-resisting alloy.

FIG. 5.—"Chemico" sulfuric acid concentrator, drum type. (*Courtesy of Chemical Construction Corporation.*)

[1] Such tower concentrators have been built by Kalbperry Corp. and the Chemical Construction Corp. See FAIRLIE, *op. cit.*, pp. 319–324; WELLS and FOGG, The Manufacture of Sulfuric Acid, pp. 138–140, *Bull.* 184, U.S. Bureau of Mines, 1920.

[2] *Private communication; cf.* also circulars of National Lead Co. and pp. 301–308, 241 of Rogers, *op. cit.*

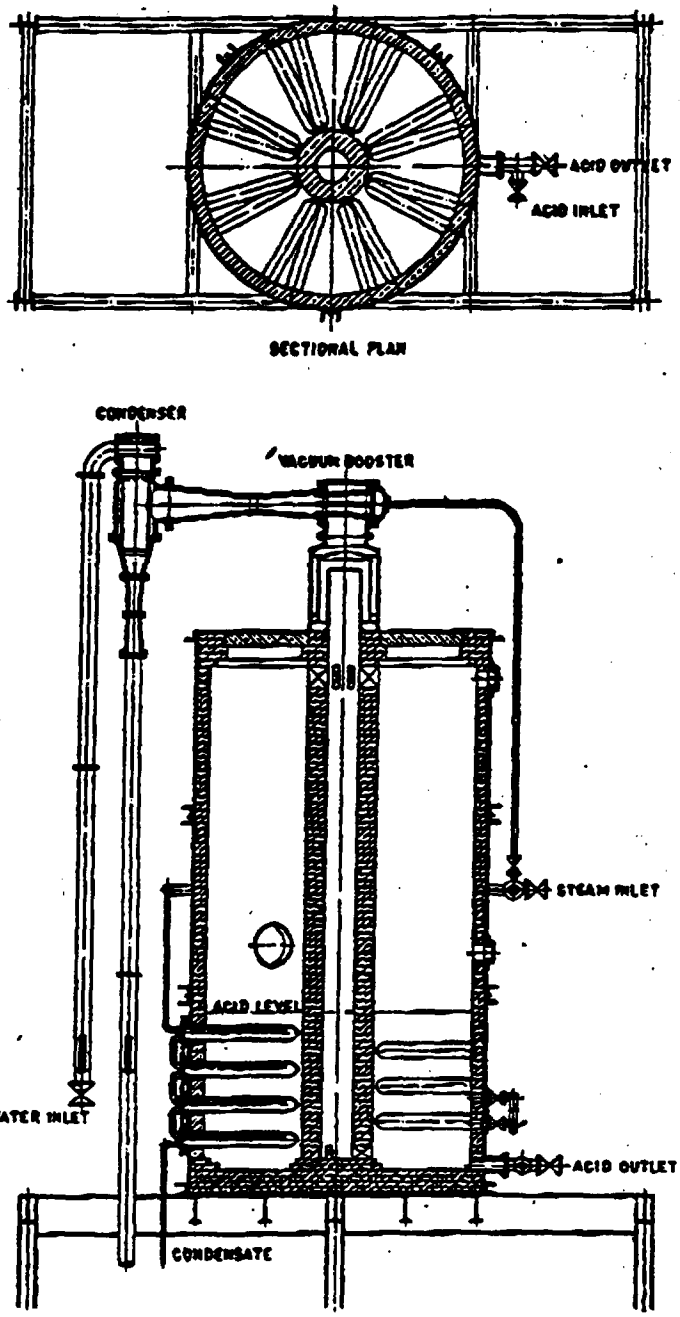

FIG. 6.—Simonson-Mantius vacuum concentrator for sulfuric acid. (*Courtesy of National Lead Company.*)

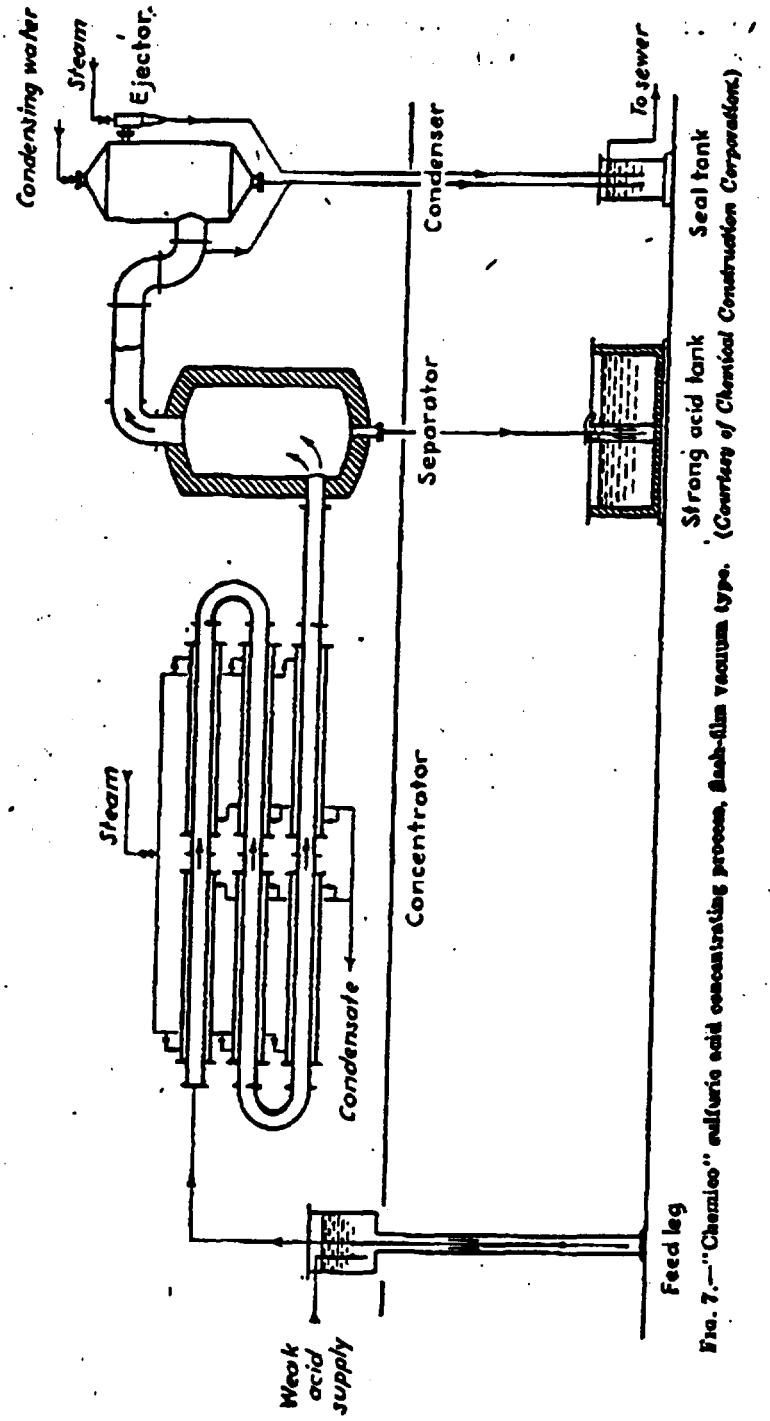

FIG. 7.—"Chemico" sulfuric acid concentrating process, flash-film vacuum type. (Courtesy of Chemical Construction Corporation.)

The Chemico flash film concentrator as shown by Fig. 7 is a continuous apparatus with the weak acid to be concentrated passing down through a series of connected return bends of high silicon acidproof pipe, jacketed for steam. It operates usually under vacuum produced by a steam ejector and a barometric leg. Because of the rapid acid flow in films, an efficient heat transfer is attained. This type of concentrator is also used to distill 95 per cent HNO_3 from tower nitric acid as weak as 50 per cent, using strong sulfuric acid as the dehydrating agent. The weakened sulfuric acid can then be reconcentrated in another such unit.

Improvements in the Chamber Process.—Because of the large volume of acid made by the chamber process, there have been many new designs introduced to better the economics of this process. One of the first of these was the Pratt procedure which obtained popularity between 1890 and 1910. It differed from the ordinary plants by having the first chamber much larger than the others and by placing between the first and second chambers a tower known as the *converter*. This was a packed tower, about 25 ft. in height, which provided intimate mixing and, therefore, produced a large amount of acid. The gases issuing from the top of the tower were divided and part of them fed back into the largest chamber, the other part being sent on to the smaller chambers.

In 1913 in England there were erected chambers in the shape of truncated cones with provision for water cooling on the outside. These were invented by Mills and Packard.[1] Such chambers reduce the space per pound of brimstone burned per day from 8 to about 3 cu. ft. Redesigned plants of this type may be constructed so compactly that chambers for a 100-ton plant may be erected on 100 sq. ft. of ground. Recently at Tampa, Fla., a 300-ton (60°Bé.) per day plant has been put into operation.[2] This is illustrated by Fig. 8. It needs only 2.75 cu. ft. of chamber space per pound of sulfur burned per day.

Another plant for the reduction of space is the Gaillard-Parrish acid-cooled chamber. This consists of a steel-framed cylindrical lead chamber which has at the top a "turbodispenser" that cools the chamber walls from the inside by spraying them with a shower by a finely divided precooled chamber acid. These towers are usually 50 ft. or more tall and may handle 500 to 2,000 tons of chamber acid per hour. Here again only about 3 cu. ft. of chamber space is needed per pound of brimstone burned per day.

An interesting plant has been installed by the Anaconda Copper Company at Anaconda, Mont. This consists of the usual Glover and

[1] FAIRLIE, Mills-Packard Sulfuric Acid Chambers, *Chem. & Met. Eng.*, **44**, 728, (1937). For many improvements both in America and Europe, see Fairlie, "Manufacture of Sulfuric Acid," *op. cit.*, Chap. 9, etc.

[2] FAIRLIE, Building the World's Largest Mills-Packard Acid Plant, *Chem. & Met. Eng.*, **50**, No. 9, 103 (1943).

Gay-Lussac towers operated in conjunction with several packed towers built of acidproof masonry much like the Glover towers. In the Anaconda process the heat of reaction is removed by the circulation through the packed towers of precooled acid of such a concentration that it does not absorb the oxides of nitrogen. In this plant the rate of reaction is increased by raising the concentration of the oxides of nitrogen to about

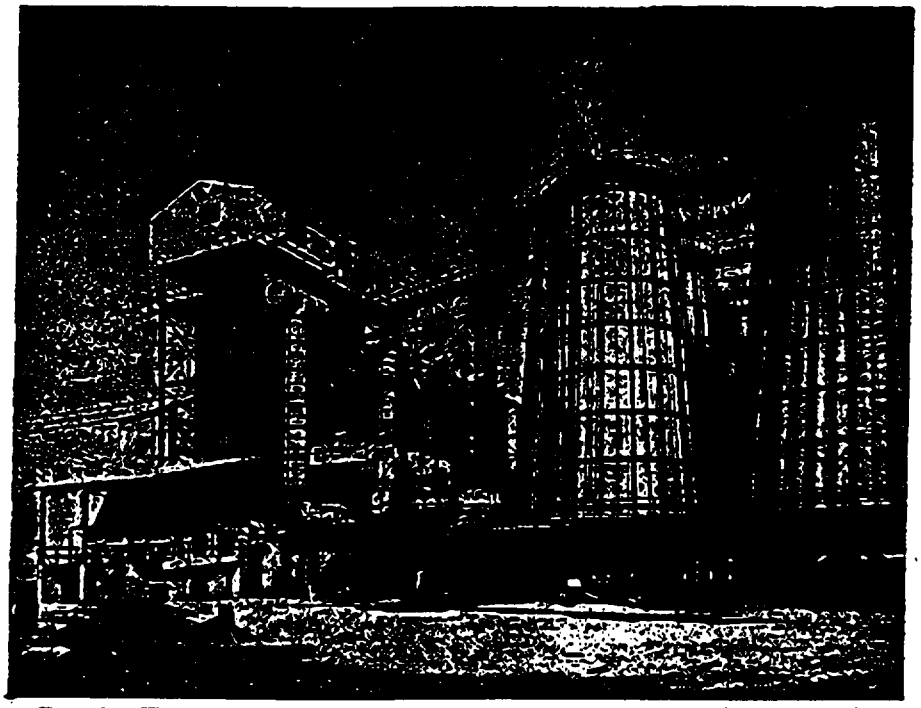

FIG. 8.—World's largest Mills-Packard chamber sulfuric acid plant, located at Tampa, Fla. The 20 lead chambers have a total of 440,000 cu. ft. There are two Glover and three Gay-Lussac towers. (*Courtesy of U.S. Phosphoric Products Division, Tennessee Corporation.*)

three times that in the ordinary chambers, that is to about 70 per cent (as $NaNO_3$) based on the sulfur burned. This plant operates with only 1 cu. ft. of space per pound of sulfur burned per day.

Other processes worthy of mention are the Falding process which consists of chambers about 75 ft. tall followed by cooling towers; the Schmidel process in which the sulfuric gases are showered with nitrous vitriol; the pressure process in which the sulfurous gases are placed in a small tower which replaces the chambers; and the Watson process in which no towers are used and the acid is sprayed into chambers.

MANUFACTURE BY THE CONTACT PROCESS

Until 1900 no contact plant had been built in the United States. In Europe the contact method had become important by that time for the

2. PROJECT MANAGEMENT SUMMARY

Site Name: DEGUSSA CORP. ALABAMA GROUP

Site Number: ALD075045575

Owner: DEGUSSA CORP., SHELL CHEMICAL

Operator: DEGUSSA CORP.

Site Status: [X] Active [ ] Inactive [ ] Unknown

Priority: [ ] High [ ] Medium [ ] Low [X] None

3. FINAL DISPOSITION

I. EPS Final Review - Date: 8/4/84

Comments: _____

Site Inspection Required [ ] Yes [ ] No

II. ADEM Review - Date:

Comments: _____

Follow-up Action Required [ ] Yes [ ] No

III. Final Disposition:

Review & revise	Date:	
Edited & correct	Date:	
Transmitted	Date:	
File close-out	Date:	
Initiate site inspection	Date:	

4. ADDITIONAL COMMENTS (ONGOING & FINAL)

Doc. 1

1/7

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
EPS FORM 3012-III

INDUSTRIAL NARRATIVE SHEET

1. Site Identification:

Site number: ALD075045575

Site name: Degussa Corporation, Alabama Group

Site county: Mobile

2. Industrial Narrative Summary:

Company Name: Degussa Corporation, Alabama Group

Address: Post Office Box 606
Theodore, Alabama 36582

Telephone No.: (205) 653-7933

Contact: Gene Sheppard

Contact: Bill Howard, Chief Chemist

Discussion: Degussa manufactures both organic and inorganic chemicals. Products include silicone tetrachloride, cyanuric chloride, hydrocyanic acid, amin-iso-butyronitrile, ammonium sulfate, and methionine. In the manufacture of methionine, they use B-Methylmercaptopropronaldehyde (MMP). Hydrogen cyanide is also used in their manufacturing processes. They have an incinerator which has the off-gases from the storage tanks vented to it. EPA has ruled that this does not constitute a treatment facility and so these materials have been removed from their Part A application. This incinerator is currently being regulated by the air division at ADEM. There has been no evidence of any problems with organic discharges or cyanide. The incinerator operates within a temperature range of 800-1000 degrees C to prevent such releases. Storage tanks are within diked areas and are also being regulated at the ADEM offices. Concern was expressed about possible discharges of this material to surface waters and this has been addressed through the NPDES division. Both hazardous and nonhazardous waste is being manifested and disposed at secure landfills to prevent any problems. The MMP and Potassium Carbonate waste streams have odor problems so care is taken with disposal. There have been several complaints about

waste disposal throughout the history of the facility but these have either been nonhazardous materials or they have been cleaned up by Degussa. These instances are documented in the ADEM files. There are three past disposal areas indicated on the facility line drawing. These areas have been cleaned up and in one instance where there was evidence of some soil contamination, sampling and analysis was done. At one time they did have a spill of cyanuric chloride. The entire spill area was on a concrete pad and the material was shoveled into drums and sent to Rollins. There is evidence in all the ADEM departmental files that close attention has been paid to this facility and the environmental interface. Any past problems are documented on the files and there is no evidence of any unresolved problems. This facility has withdrawn from interim status and retains status as a generator only.

There is a groundwater problem in the area associated with an ammonium sulfate spill. This is being resolved through the water division at ADEM.

3. Disposition:

Degussa has documented disposal activities during their ten year history at the site. There appear to be no problems associated with this company's disposal activities. See comments below for further site information.

4. Comments:

The entire Theodore Industrial Park was at one time an Army ammunitions dump. When this plant was built, there was no evidence of any ammunitions remaining on this property. There was a report that the Kerr-McGee facility on the property next door did have to destroy bunkers when they built their plant. Undisturbed bunkers may remain.

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
EPS FORM 3012-II

TELEPHONE LOG SHEET

1. Site Identification:
   Site number: ALD075045575
   Site name: Degussa Corp., Alabama Group

2. Interview Data: (Party called)
   Name: Gene Sheppard
   Position:
   Firm: Degussa
   Address: P.O. Box 606
   Theodore, Al 36582
   Telephone No.: (205) 653-7933

3. EPS Analyst Data:
   Name: Donalea Dinsmore
   Purpose of call: Investigate past disposal activities, question info on the generator report, get directions to facility
   Form 2070-12 (7-81) P.N.
   Date of call: 8-1-84

4. Interview Narrative Summary: Directions given to site. Operations have taken place in two phases. Initially begun in 1974 and CYC unit began in 1978. Began using Rollins and Chemical Waste Management long before the regulations because they forsaw the coming of the reg's. All waste is manifested regardless of hazardous or not due to aromatic nature of the material and as a safegard. Prior to 1978, the furnace ash was stored in wooden grates on the north end of property. This was drummed and sent to a secure landfill. Soil testing done at that time. No problems indicated. All drum storage areas have been cleaned up. Correspondence with ADEM will document this. Raw materials were changed in order to assure that the furnace ash would not be considered hazardous due to the barium content. Prior to the change, the ash was borderline and large efforts were went through to assure that this material would be non-hazardous. Incinerator addressed and confirmed that the materials incinerated were not hazardous waste so that it is not considered a treatment facility. The MMP was incorrectly listed on the 1983 generator report as a hazardous waste. It is not even though it is being handled as such by the company. The material has a bad odor so they take care of where they dispose of it. There has not been any disposal of hazardous wastes on-site. Nothing buried due to high water table. Prior to occupancy by Degussa, this site was an Army Ammunition Dump. There were no ammunitions discovered on-site during construction to the best of his knowlege.

5. Disposition/Comments:
   No further action is required at this time at this site. They have documented disposal activities fairly well over the plant history. Concern about land use prior to Degussa occupancy.

6. Comments: Any additional sites used by this company?
   Location:
   Dates of use:
   Description of waste:
   Comments:

4/7

review process.

Review Codes: 1-Toxicology Review; 2-Chemical Review; 3-Ecology Review; 4-Chemical Engineer Review; 5-Geotechnical Review; 6-Project Manager Review; 7-Final Review

1. ANALYST/REVIEW STATUS

Form 2070 Part Number	Analyst/ Date	Review Code 1	Review Code 2	Review Code 3	Review Code 4	Review Code 5	Review Code 6	Review Code 7
1.I.-VI.	8/1/84 DD							
							JAW 8/4	JAW 8/4
2.I.								
2.II.								
2.III.								
2.IV.								
2.V.								
2.VI.								
3.I.								
3.II.A								
3.II.B								
3.II.C								
3.II.D								
3.II.E								
3.II.F								
3.II.G								
3.II.H								
3.II.I								
3.II.J								
3.II.K								
3.II.L								
3.II.M								
3.II.N								
3.II.O								
3.II.P								
3.III.								
3.IV.								
3.V.								

*No further assessment/review required, enter NA

7/7

LESUSA

APPENDIX C

SITE INSPECTION WORKSHEETS

CONFIDENTIAL

This appendix consists of worksheets that can be used to generate an SI site score. Completion of these worksheets is not required, but the SI investigator must evaluate an SI score, either by these worksheets, *PREscore*, or other Regional scoring tools.

The worksheets consist of instructions and data tables to be filled in with scores from HRS reference tables. The data tables may also call for Data Type and References.

DATA TYPE: The Data Type columns should be filled in with an **H**, **Q**, or **+** if the data are HRS quality and well documented. The Data Type column should be filled in with an **E**, **X**, or **-** if the data represent estimates, approximations, or are not fully documented. This type identifies data gaps for the expanded SI to investigate.

REFERENCES: The Reference columns should be filled in with coded reference numbers. The numbered reference list should be attached or the numbering should be cross-referenced to the SI Narrative Report.

The SI investigator will need the current Superfund Chemical Data Matrix (SCDM) OSWER Directive 9345.1-13 (revised semi-annually) to complete these worksheets.

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SITE INSPECTION WORKSHEETS

CERCLIS IDENTIFICATION NUMBER
EPA ID # ALD 075 045 575

SITE LOCATION

SITE NAME: LEGAL, COMMON, OR DESCRIPTIVE NAME OF SITE			
DEGUSSA CORP.			
STREET ADDRESS, ROUTE, OR SPECIFIC LOCATION IDENTIFIER			
THEODORE INDUSTRIAL PARK / POR 606			
CITY	STATE	ZIP CODE	TELEPHONE
THEODORE	AL	36590	(205)
COORDINATES: LATITUDE and LONGITUDE	TOWNSHIP, RANGE, AND SECTION		
30° 31' 23" & 088° 08' 23"	T 6 S, R 2 W, S 23		

OWNER/OPERATOR IDENTIFICATION

OWNER			OPERATOR		
DEGUSSA CORP					
OWNER ADDRESS			OPERATOR ADDRESS		
CITY			CITY		
STATE	ZIP CODE	TELEPHONE ( )	STATE	ZIP CODE	TELEPHONE ( )

SITE EVALUATION

AGENCY/ORGANIZATION		
ADEM		
INVESTIGATOR		
C N SCOTT		
CONTACT		
ADDRESS		
1751 DICKINSON DR.	STATE	ZIP CODE
CITY	AL	36130
MONTGOMERY		
TELEPHONE		
(205) 271-7700 / 260-2700		

GENERAL INFORMATION

Site Description and Operational History: Provide a brief description of the site and its operational history. State the site name, owner, operator, type of facility and operations, size of property, active or inactive status, and years of waste generation. Summarize waste treatment, storage, or disposal activities that have or may have occurred at the site; note whether these activities are documented or alleged. Identify all source types and prior spills, floods, or fires. Summarize highlights of the PA and other investigations. Cite references.

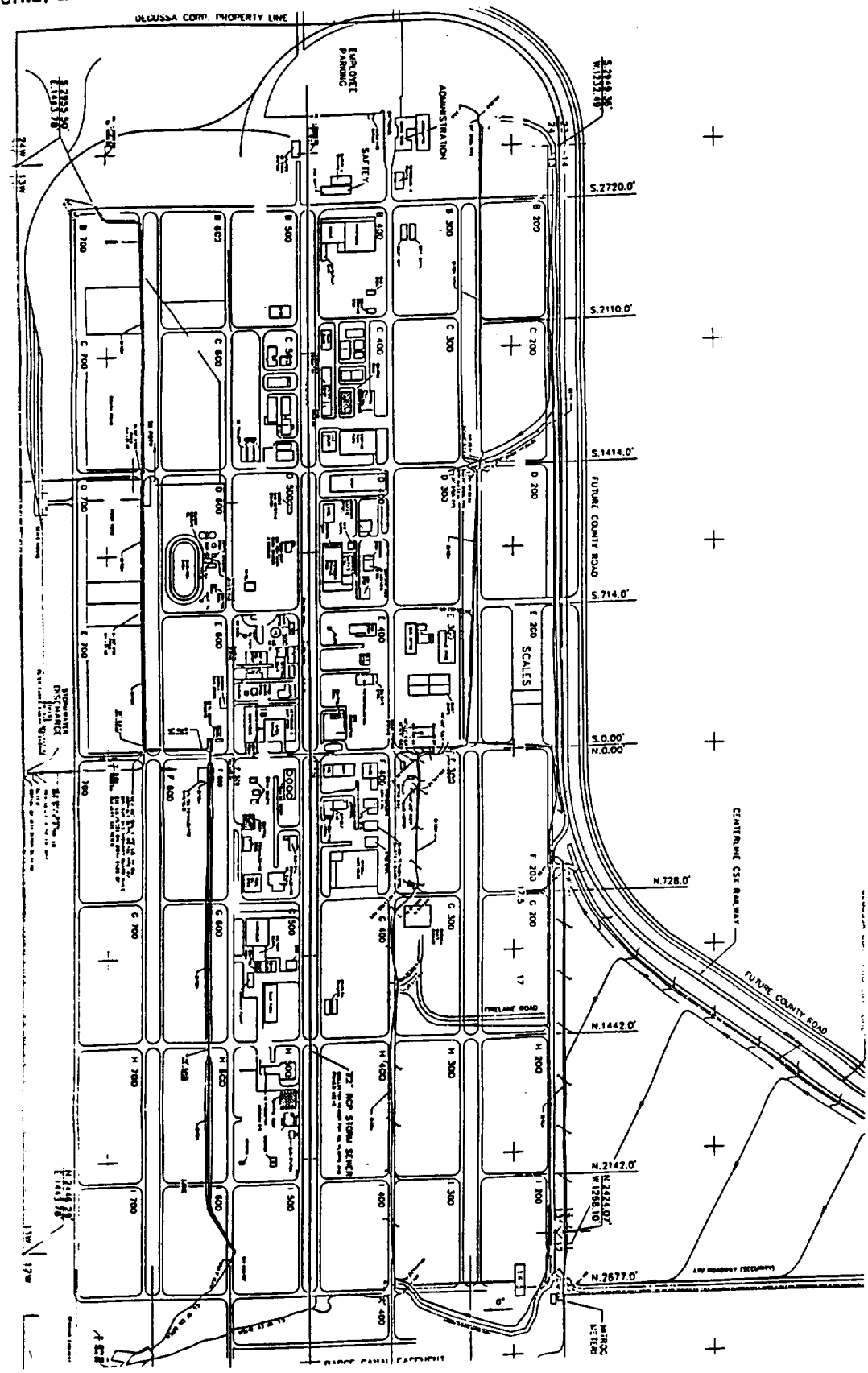
Degussa is an active regulated site (RCRA, CWA and CAA) at this writing doing business as the Degussa Corporation. The facility is located on about 500 acres in the Theodore Industrial Park, about 15 miles south of Mobile Alabama. Degussa generates numerous intermediaries to produce the final "shipped" products, with the primary being: methionine, H2O2 and fumed silica.

The site is located in Mobile County south of Theodore, section 23 of Township 6 South, Range 2 West. at a the approximate coordinates: latitude 30° 31' 23" and longitude 88° 08' 23". Generally, the setting is industrial with several other large chemical or manufacturing facilities within 3 miles of Degussa. Suburban areas associated with Theodore/Mobile exist in the 1 mile to 4 mile radii, primarily toward the north west. Other inhabited areas include the community of South Orchard, located 3 to 4 miles south of the site. Headwaters of Dykes Creek and associated lowlands are located adjacent to the south side of the site and the Alabama State Docks dredge spoil area are located on adjacent property to the west of the facility. The facility was originally built in the early 1970s for the Degussa Corporation and has been operating as Degussa Corporation since construction completion in early 1974.

Production of fumed silica (inert fibrous fillers), methionine and hydrogen peroxide are the primary products, as well as numerous intermediaries from numerous feedstocks. The facility is not a TSD nor are there any closed impoundment on-site. The only "waste/source" identification included furnace ashes that were stored in crates on the north side of the property, on 2-3 foot thick clay pad construction crew parking lots in the late 1970s. Some of the crates deteriorated resulting in spillage of the ash material, at which time Degussa reportedly bermed the lot to preclude runoff. Waste material along with some of the graded clay was subsequently disposed of at an off site landfill.

GENERAL INFORMATION (continued)

Site Sketch: Provide a sketch of the site. Indicate all pertinent features of the site and nearby environments including sources of wastes, areas of visible and buried wastes, buildings, residences, access roads, parking areas, fences, fields, drainage patterns, water bodies, vegetation, wells, sensitive environments, and other features.



GENERAL INFORMATION (continued)

Source Description: Include description of containment per pathway for ground water (see HRS Table 3-2), surface water (see HRS Table 4-2), and air (see HRS Tables 6-3 and 6-9).

Hazardous Waste Quantity (HWQ) Calculation: SI Tables 1 and 2 (See HRS Tables 2-5, 2-6, and 5-2).

ASSUME: ALL CONTAMINATED SOIL $\leq$ 500 ac

$\therefore$ HWQ = 100

HWQ =

Attach additional pages, if necessary

HAZARDOUS WASTE QUANTITY (HWQ) CALCULATION

For each migration pathway, evaluate HWQ associated with sources that are available (i.e., incompletely contained) to migrate to that pathway. (Note: If *Actual Contamination Targets* exist for ground water, surface water, or air migration pathways, assign the calculated HWQ score or 100, whichever is greater, as the HWQ score for that pathway.) For each source, evaluate HWQ for one or more of the four tiers (SI Table 1; HRS Table 2-5) for which data exist: constituent quantity, wastestream quantity, source volume, and source area. Select the tier that gives the highest value as the source HWQ. Select the source volume HWQ rather than source area HWQ if data for both tiers are available.

Column 1 of SI Table 1 indicates the quantity tier. Column 2 lists source types for the four tiers. Columns 3, 4, 5, and 6 provide ranges of waste amount for sites with only one source, corresponding to HWQ scores at the tops of the columns. Column 7 provides formulas to obtain source waste quantity values at sites with multiple sources.

1. Identify each source type.
2. Examine all waste quantity data available for each source. Record constituent quantity and waste stream mass or volume. Record dimensions of each source.
3. Convert source measurements to appropriate units for each tier to be evaluated.
4. For each source, use the formulas in the last column of SI Table 1 to determine the waste quantity value for each tier that can be evaluated. Use the waste quantity value obtained from the highest tier as the quantity value for the source.
5. Sum the values assigned to each source to determine the total site waste quantity.
6. Assign HWQ score from SI Table 2 (HRS Table 2-6).

Note these exceptions to evaluate soil exposure pathway HWQ (see HRS Table 5-2):

- The divisor for the area (square feet) of a landfill is 34,000.
- The divisor for the area (square feet) of a pile is 34.
- Wet surface impoundments and tanks and non-drum containers are the only sources for which volume measurements are evaluated for the soil exposure pathway.

SI TABLE 2: HWQ SCORES FOR SITES

Site WQ Total	HWQ Score
0	0
1[a] to 100	1[b]
> 100 to 10,000	100
> 10,000 to 1 million	10,000
> 1 million	1,000,000

a If the WQ total is between 0 and 1, round it to 1.
b If the hazardous constituent quantity data are not complete, assign the score of 10.

SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET

Site Name: DC GUSSA

References FA

SCDHS

Sources:

1. CONTAMINATED SOIL ASH
2.
3.
4.
5.
6.
7.
8.
9.

SOURCE	HAZARDOUS SUBSTANCE	TOXICITY	GROUND WATER PATHWAY		SURFACE WATER PATHWAY										
					OVERLAND/FLOOD MIGRATION							GROUND WATER TO SURFACE WATER			
			GW Mobility (HRS Table 3-8)	Tox/ Mobility Value (HRS Table 3-9)	Per (HRS Tables 4-10 and 4-11)	Tox/Per Value (HRS Table 4-12)	Bioac Pot. (HRS Table 4-15)	Tox/ Pers/ Bioac Value (HRS Table 4-16)	Ecotox (HRS Table 4-19)	Ecotox/ Pers (HRS Table 4-20)	Ecotox/ Pers/ Bioacc Value (HRS Table 4-21)	Tox/ Mob/ Pers Value (HRS Table 4-26)	Tox/ Mob/ Pers/ Bioacc Value (HRS Table 4-28)	Ecotox/ Mob/ Pers Value (HRS Table 4-29)	Ecotox/ Mob/ Per/ Bioacc Value (HRS Table 4-30)
1	CR	10,000	1	10,000	1	10,000	5.0	50,000	10	10	50				

Ground Water Observed Release Substances Summary Table

On SI Table 4, list the hazardous substances associated with the site detected in ground water samples for that aquifer. Include only those substances directly observed or with concentrations significantly greater than background levels. Obtain toxicity values from the Superfund Chemical Data Matrix (SCDM). Assign mobility a value of 1 for all observed release substances regardless of the aquifer being evaluated. For each substance, multiply the toxicity by the mobility to obtain the toxicity/mobility factor value; enter the highest toxicity/mobility value for the aquifer in the space provided.

Ground Water Actual Contamination Targets Summary Table

If there is an observed release at a drinking water well, enter each hazardous substance meeting the requirements for an observed release by well and sample ID on SI Table 5 and record the detected concentration. Obtain benchmark, cancer risk, and reference dose concentrations from SCDM. For MCL and MCLG benchmarks, determine the highest percentage of benchmark obtained for any substance. For cancer risk and reference dose, sum the percentages for the substances listed. If benchmark, cancer risk, or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage or the percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate the population using the well as a Level I target. If these percentages are less than 100% or all are N/A, evaluate the population using the well as a Level II target for that aquifer.

GROUND WATER PATHWAY
GROUND WATER USE DESCRIPTION

Describe Ground Water Use within 4 Miles of the Site:
Describe generalized stratigraphy, aquifers, municipal and private wells

Ground water monitoring occurred in the past with concern over elevated "total dissolved solids" and chlorides, however, contaminant levels have diminished to the point of no longer being a concern. The surficial aquifer or ground water is typically 10 to 20 feet below the surface at the facility. The site is located in the Alluvial-Deltaic Plains physiographic section. The major underlying formation is the Miocence Series, undifferentiated, which is composed of gray, orange and red fine to course grained sand, red ferruginous sandstone, and sandy silty clay. The Miocene series, undifferentiated is about 2000 feet thick.. The main production zone in the immediate vicinity of the site is located in the Miocene/Pliocene aquifer in the sand units located near the base of the aquifer. The top of the aquifer generally occurs 125 to 150 feet below the land surface, with individual sand beds being 50 to 100 feet thick. The regional Groundwater flow is south-southwesterly, the same direction as regional dip. Groundwater in this aquifer is recharged by precipitation in areas west and north of the facility. The water table aquifer may discharge to local streams and form swamps in topographic lows, such as near Dykes Creek to the south. Sand and gravel units are generally too thin around the facility for significant aquifer usage. However, small quantities of good quality water are available for domestic use.

Show Calculations of Ground Water Drinking Water Populations for each Aquifer:
Provide apportionment calculations for blended supply systems.
County average number of persons per household: 2.71 Reference _____

3920 × 2.5 = 9,800

Within four miles of the site, are several industrial water supply wells and one public water supply well. The public well belongs to the Mobile County Water and is about three miles north of the site. This well is 148 feet deep and screened in the alluvium. Mobile County Water Works services 3,920 connections (2.5 persons/connection based on county average) or about 9,800 individuals.

GROUND WATER PATHWAY WORKSHEET

LIKELIHOOD OF RELEASE	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to the aquifer, assign a score of 550. Record observed release substances on SI Table 4.			
2. POTENTIAL TO RELEASE: Depth to aquifer: 15 feet. If sampling data do not support a release to the aquifer, and the site is in karst terrain or the depth to aquifer is 70 feet or less, assign a score of 500; otherwise, assign a score of 340. Optionally, evaluate potential to release according to HRS Section 3.	500	—	
	LR = 500		

TARGETS			
Are any wells part of a blended system? Yes____ No✓ If yes, attach a page to show apportionment calculations. 3. ACTUAL CONTAMINATION TARGETS: If analytical evidence indicates that any target drinking water well for the aquifer has been exposed to a hazardous substance from the site, evaluate the factor score for the number of people served (SI Table 5). Level I: _____ people x 10 = _____ Level II: _____ people x 1 = _____ Total =	0		
4. POTENTIAL CONTAMINATION TARGETS: Determine the number of people served by drinking water wells for the aquifer or overlying aquifers that are not exposed to a hazardous substance from the site; record the population for each distance category in SI Table 6a or 6b. Sum the population values and multiply by 0.1.	41.7		
5. NEAREST WELL: Assign a score of 50 for any Level I Actual Contamination Targets for the aquifer or overlying aquifer. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Targets exist, assign the Nearest Well score from SI Table 6a or 6b. If no drinking water wells exist within 4 miles, assign 0.	—		
6. WELLHEAD PROTECTION AREA (WHPA): If any source lies within or above a WHPA for the aquifer, or if a ground water observed release has occurred within a WHPA, assign a score of 20; assign 5 if neither condition applies but a WHPA is within 4 miles; otherwise assign 0.	0		
7. RESOURCES: Assign a score of 5 if one or more ground water resource applies; assign 0 if none applies. • Irrigation (5 acre minimum) of commercial food crops or commercial forage crops • Watering of commercial livestock • Ingredient in commercial food preparation • Supply for commercial aquaculture • Supply for a major or designated water recreation area, excluding drinking water use	0		
Sum of Targets T=	41.7		

SI TABLE 6 (From HRS TABLE 3-12): VALUES FOR POTENTIAL CONTAMINATION GROUND WATER TARGET POPULATIONS

SI Table 6a: Other Than Karst Aquifers

Distance from Site	Pop.	Nearest Well (choose highest)	Population Served by Wells within Distance Category												Pop. Value	Ref.
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,000 to 3,000,000		
0 to $\frac{1}{4}$ mile		20	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455		
$>\frac{1}{4}$ to $\frac{1}{2}$ mile		18	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122		
$>\frac{1}{2}$ to 1 mile		9	1	5	17	52	167	523	1,669	5,224	16,684	52,239	166,835	522,385		
> 1 to 2 miles		5	0.7	3	10	30	94	294	939	2,939	9,385	29,384	93,845	293,842		
> 2 to 3 miles		3	0.5	2	7	21	68	212	678	2,122	6,778	21,222	67,777	212,219		
>3 to 4 miles		2	0.3	1	4	13	42	131	417	1,306	4,171	13,060	41,709	130,596		

Nearest Well = 2 **Sum =** 417

SI TABLE 6 (From HRS TABLE 3-12): VALUES FOR POTENTIAL CONTAMINATION GROUND WATER TARGET POPULATIONS (continued)

SI Table 6b: Karst Aquifers

Distance from Site	Pop.	Nearest Well (choose highest)	Population Served by Wells within Distance Category												Pop. Value	Ref.
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,000 to 3,000,000		
0 to $\frac{1}{4}$ mile		20	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455		
$>\frac{1}{4}$ to $\frac{1}{2}$ mile		20	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122		
$>\frac{1}{2}$ to 1 mile		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		
>1 to 2 miles		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		
>2 to 3 miles		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		
>3 to 4 miles		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		
Nearest Well =														Sum =		

GROUND WATER PATHWAY WORKSHEET (concluded)

WASTE CHARACTERISTICS	Score	Data Type	Does not Apply
8. If any Actual Contamination Targets exist for the aquifer or overlying aquifers, assign the calculated hazardous waste quantity score or a score of 100, whichever is greater; if no Actual Contamination Targets exist, assign the hazardous waste quantity score calculated for sources available to migrate to ground water.	100		
9. Assign the highest ground water toxicity/mobility value from SI Table 3 or 4.	10,000		
10. Multiply the ground water toxicity/mobility and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below: (from HRS Table 2-7)			

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 or greater	100

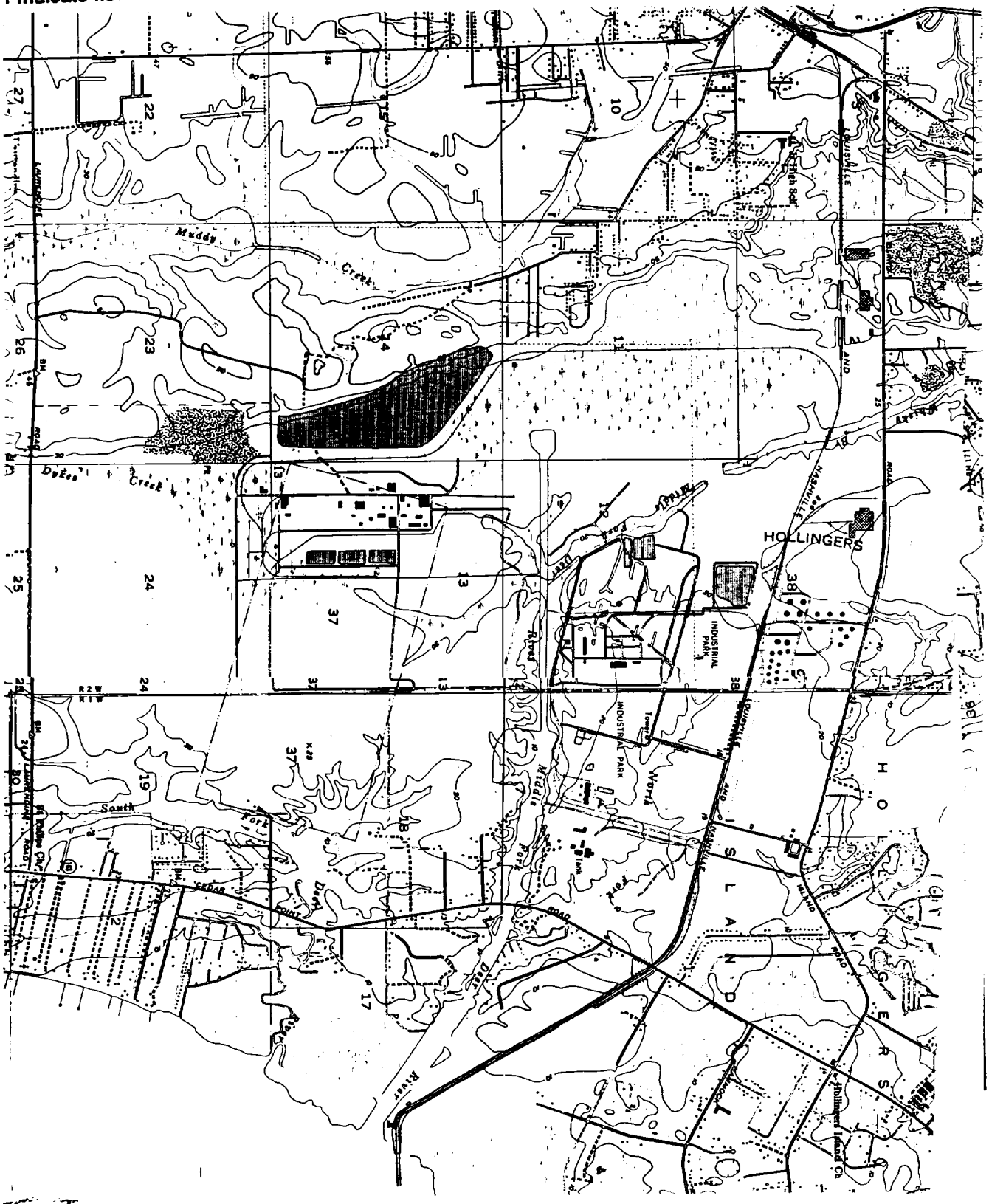
WC = 32

Multiply LR by T and by WC. Divide the product by 82,500 to obtain the ground water pathway score for each aquifer. Select the highest aquifer score. If the pathway score is greater than 100, assign 100.

GROUND WATER PATHWAY SCORE: $\frac{LR \times T \times WC}{82,500}$ = 5.48 (Maximum of 100)

SURFACE WATER PATHWAY

Sketch of the Surface Water Migration Route:
Label all surface water bodies. Include runoff route and drainage direction, probable point of entry, and 15-mile target distance limit. Mark sample locations, intakes, fisheries, and sensitive environments. Indicate flow directions, tidal influence, and rate.



SURFACE WATER PATHWAY

Surface Water Observed Release Substances Summary Table

On SI Table 7, list the hazardous substances detected in surface water samples for the watershed, which can be attributed to the site. Include only those substances in observed releases (direct observation) or with concentration levels significantly above background levels. Obtain toxicity, persistence, bioaccumulation potential, and ecotoxicity values from SCDM. Enter the highest toxicity/persistence, toxicity/persistence/bioaccumulation, and ecotoxicity/persistence/ecobioaccumulation values in the spaces provided.

- TP = Toxicity x Persistence
- TPB = TP x bioaccumulation
- ETPB = EP x bioaccumulation (EP = ecotoxicity x persistence)

Drinking Water Actual Contamination Targets Summary Table

For an observed release at or beyond a drinking water intake, on SI Table 8 enter each hazardous substance by sample ID and the detected concentration. For surface water sediment samples detecting a hazardous substance at or beyond an intake, evaluate the intake as Level II contamination. Obtain benchmark, cancer risk, and reference dose concentrations for each substance from SCDM. For MCL and MCLG benchmarks, determine the highest percentage of benchmark obtained for any substance. For cancer risk and reference dose, sum the percentages of the substances listed. If benchmark, cancer risk, or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage or the percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate the population served by the intake as a Level I target. If the percentages are less than 100% or all are N/A, evaluate the population served by the intake as a Level II target.

SI TABLE 7: SURFACE WATER OBSERVED RELEASE SUBSTANCES

Sample ID	Hazardous Substance	Bckgrd. Conc.	Toxicity/ Persistence	Toxicity/ Persis./ Bioaccum	Ecotoxicity/ Persis/ Ecobioaccum	References
		Highest Values				

SI TABLE 8: SURFACE WATER DRINKING WATER ACTUAL CONTAMINATION TARGETS

Intake ID: _____ Sample Type _____ Level I _____ Level II _____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

Intake ID: _____ Sample Type _____ Level I _____ Level II _____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

SURFACE WATER PATHWAY
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET

LIKELIHOOD OF RELEASE– OVERLAND/FLOOD MIGRATION	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7.	—		
2. POTENTIAL TO RELEASE: Distance to surface water: ____(feet) If sampling data do not support a release to surface water in the watershed, use the table below to assign a score from the table below based on distance to surface water and flood frequency.		→	

Distance to surface water <2500 feet	500
Distance to surface water >2500 feet, and:	
Site in annual or 10-yr floodplain	500
Site in 100-yr floodplain	400
Site in 500-yr floodplain	300
Site outside 500-yr floodplain	100

Optionally, evaluate surface water potential to release according to HRS Section 4.1.2.1.2

LR = 500

LIKELIHOOD OF RELEASE GROUND WATER TO SURFACE WATER MIGRATION	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7. NOTE: Evaluate ground water to surface water migration only for a surface water body that meets all of the following conditions: 1) A portion of the surface water is within 1 mile of site sources having a containment factor greater than 0. 2) No aquifer discontinuity is established between the source and the above portion of the surface water body. 3) The top of the uppermost aquifer is at or above the bottom of the surface water. Elevation of top of uppermost aquifer _____ Elevation of bottom of surface water body _____			
2. POTENTIAL TO RELEASE: Use the ground water potential to release. Optionally, evaluate surface water potential to release according to HRS Section 3.1.2.			

LR = _____

SURFACE WATER PATHWAY
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET (CONTINUED)

DRINKING WATER THREAT TARGETS	Score	Data Type	Refs
Record the water body type, flow, and number of people served by each drinking water intake within the target distance limit in the watershed. If there is no drinking water intake within the target distance limit, assign 0 to factors 3, 4, and 5. Intake Name / Water Body Type / Flow / People Served _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ Are any intakes part of a blended system? Yes _____ No _____ If yes, attach a page to show apportionment calculations. 3. ACTUAL CONTAMINATION TARGETS: If analytical evidence indicates a drinking water intake has been exposed to a hazardous substance from the site, list the intake name and evaluate the factor score for the drinking water population (SI Table 8). _____ _____ Level I: _____ people x 10 = _____ Level II: _____ people x 1 = _____ **Total =**	0		
4. POTENTIAL CONTAMINATION TARGETS: Determine the number of people served by drinking water intakes for the watershed that have not been exposed to a hazardous substance from the site. Assign the population values from SI Table 9. Sum the values and multiply by 0.1.	0		
5. NEAREST INTAKE: Assign a score of 50 for any Level I Actual Contamination Drinking Water Targets for the watershed. Assign a score of 45 if there are Level II targets for the watershed, but no Level I targets. If no Actual Contamination Drinking Water Targets exist, assign a score for the intake nearest the PPE from SI Table 9. If no drinking water intakes exist, assign 0.	0		
6. RESOURCES: Assign a score of 5 if one or more surface water resource applies; assign 0 if none applies. • Irrigation (5 acre minimum) of commercial food crops or commercial forage crops • Watering of commercial livestock • Ingredient in commercial food preparation • Major or designated water recreation area, excluding drinking water use	5		
SUM OF TARGETS T=	5		

SI TABLE 9 (From HRS Table 4-14): DILUTION-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FOR SURFACE WATER MIGRATION PATHWAY

Type of Surface Water Body	Pop.	Nearest Intake	Number of people									Pop. Value
			0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	
Minimal Stream (<10 cfs)		20	0	4	17	53	164	522	1,633	5,214	16,325	
Small to moderate stream (10 to 100 cfs)		2	0	0.4	2	5	16	52	163	521	1,633	
Moderate to large stream (> 100 to 1,000 cfs)		0	0	0.04	0.2	0.5	2	5	16	52	163	
Large Stream to river (>1,000 to 10,000 cfs)		0	0	0.004	0.02	0.05	0.2	0.5	2	5	16	
Large River (> 10,000 to 100,000 cfs)		0	0	0	0.002	0.005	0.02	0.05	0.2	0.5	16	
Very Large River (>100,000 cfs)		0	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	
Shallow ocean zone or Great Lake (depth < 20 feet)		0	0	0	0.002	0.005	0.02	0.05	0.2	0.5	2	
Moderate ocean zone or Great Lake (Depth 20 to 200 feet)		0	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	
Deep ocean zone or Great Lake (depth > 200 feet)		0	0	0	0	0	0.001	0.003	0.008	0.03	0.08	
3-mile mixing zone in quiet flowing river (≥ 10 cfs)		10	0	2	9	26	82	261	817	2,607	8,163	
Nearest Intake =		111									Sum =	

References _____

SURFACE WATER PATHWAY

Human Food Chain Actual Contamination Targets Summary Table

On SI Table 10, list the hazardous substances detected in sediment, aqueous, sessile benthic organism tissue, or fish tissue samples (taken from fish caught within the boundaries of the observed release) by sample ID and concentration. Evaluate fisheries within the boundaries of observed releases detected by sediment or aqueous samples as Level II, if at least one observed release substance has a bioaccumulation potential factor value of 500 or greater (see SI Table 7). Obtain benchmark, cancer risk, and reference dose concentrations from SCDM. For FDAAL benchmarks, determine the highest percentage of benchmark obtained for any substance. For cancer risk and reference dose, sum the percentages for the substances listed. If benchmark, cancer risk, or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate this portion of the fishery as subject to Level I concentrations. If the percentages are less than 100% or all are N/A, evaluate the fishery as a Level II target.

Sensitive Environment Actual Contamination Targets Summary Table

On SI Table 11, list each hazardous substance detected in aqueous or sediment samples at or beyond wetlands or a surface water sensitive environment by sample ID. Record the concentration. If contaminated sediments or tissues are detected at or beyond a sensitive environment, evaluate the sensitive environment as Level II. Obtain benchmark concentrations from SCDM. For AWQC/AALAC benchmarks, determine the highest percentage of benchmark of the substances detected in aqueous samples. If benchmark concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage equals or exceeds 100%, evaluate that part of the sensitive environment subject to Level I concentrations. If the percentage is less than 100%, or all are N/A, evaluate the sensitive environment as Level II.

SI TABLE 10: HUMAN FOOD CHAIN ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Fishery ID: _____ Sample Type _____ Level I _____ Level II _____ References _____

Sample ID	Hazardous Substance	Conc. (mg/kg)	Benchmark Concentration (FDAAL)	% of Benchmark	Cancer Risk Concentration.	% of Cancer Risk Concentration	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

SI TABLE 11: SENSITIVE ENVIRONMENT ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Environment ID: _____ Sample Type _____ Level I _____ Level II _____ Environment Value _____

Sample ID	Hazardous Substance	Conc.. (µg/L)	Benchmark Concentration (AWQC or AALAC)	% of Benchmark	References
			Highest Percent		

Environment ID: _____ Sample Type _____ Level I _____ Level II _____ Environment Value _____

Sample ID	Hazardous Substance	Conc.. (µg/L)	Benchmark Concentration (AWQC or AALAC)	% of Benchmark	References
			Highest Percent		

SURFACE WATER PATHWAY (continued)
HUMAN FOOD CHAIN THREAT WORKSHEET

	Score	Data Type	Refs
HUMAN FOOD CHAIN THREAT TARGETS			

Record the water body type and flow for each fishery within the target distance limit. If there is no fishery within the target distance limit, assign a score of 0 at the bottom of this page.

Fishery Name DYKES CR Water Body FRESH Flow ____ cfs
Species ____ Production ____ lbs/yr
Species ____ Production ____ lbs/yr

Fishery Name FOWLER Water Body FRESH Flow ____ cfs
Species ____ Production ____ lbs/yr
Species ____ Production ____ lbs/yr

Fishery Name ____ Water Body ____ Flow ____ cfs
Species ____ Production ____ lbs/yr
Species ____ Production ____ lbs/yr

FOOD CHAIN INDIVIDUAL

7. ACTUAL CONTAMINATION FISHERIES:

If analytical evidence indicates that a fishery has been exposed to a hazardous substance with a bioaccumulation factor greater than or equal to 500 (SI Table 10), assign a score of 50 if there is a Level I fishery. Assign 45 if there is a Level II fishery, but no Level I fishery.

8. POTENTIAL CONTAMINATION FISHERIES:

If there is a release of a substance with a bioaccumulation factor greater than or equal to 500 to a watershed containing fisheries within the target distance limit, but there are no Level I or Level II fisheries, assign a score of 20.

If there is no observed release to the watershed, assign a value for potential contamination fisheries from the table below using the lowest flow at all fisheries within the target distance limit:

Lowest Flow	FCI Value
<10 cfs	20
10 to 100 cfs	2
>100 cfs, coastal tidal waters, oceans, or Great Lakes	0
3-mile mixing zone in quiet flowing river	10

FCI Value = 20

SUM OF TARGETS T = 20

SURFACE WATER PATHWAY (continued)
ENVIRONMENTAL THREAT WORKSHEET

When measuring length of wetlands that are located on both sides of a surface water body, sum both frontage lengths. For a sensitive environment that is more than one type, assign a value for each type.

ENVIRONMENTAL THREAT TARGETS	Score	Data Type	Refs
		—	

Record the water body type and flow for each surface water sensitive environment within the target distance (see SI Table 12). If there is no sensitive environment within the target distance limit, assign a score of 0 at the bottom of the page.

Environment Name	Water Body Type	Flow
[illegible] Ent / End	wetlands	<10 cfs
		cfs
		cfs
		cfs
		cfs

9. ACTUAL CONTAMINATION SENSITIVE ENVIRONMENTS: If sampling data or direct observation indicate any sensitive environment has been exposed to a hazardous substance from the site, record this information on SI Table 11, and assign a factor value for the environment (SI Tables 13 and 14).

Environment Name	Environment Type and Value (SI Tables 13 & 14)	Multiplier (10 for Level I, 1 for Level II)	Product
		x =	
		x =	
		x =	
		x =	
		Sum =	—

10. POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS:

Flow	Dilution Weight (SI Table 12)	Environment Type and Value (SI Tables 13 & 14)	Pot. Cont.	Product
<10 cfs	1 x	wetlands 75 x	0.1 =	7.5
coastal cfs	.001 x	fresh IR. 75 x	0.1 =	.0075
cfs	x	x	0.1 =	
cfs	x	x	0.1 =	
cfs	x	x	0.1 =	
		Sum =		7.51

T = 7.51

SI TABLE 12 (HRS Table 4-13): SURFACE WATER DILUTION WEIGHTS

Type of Surface Water Body		Assigned Dilution Weight
Descriptor	**Flow Characteristics**	
Minimal stream	< 10 cfs	1
Small to moderate stream	10 to 100 cfs	0.1
Moderate to large stream	> 100 to 1,000 cfs	0.01
Large stream to river	> 1,000 to 10,000 cfs	0.001
Large river	> 10,000 to 100,000 cfs	0.0001
Very large river	> 100,000 cfs	0.00001
Coastal tidal waters	Flow not applicable; depth not applicable	0.001
Shallow ocean zone or Great Lake	Flow not applicable; depth less than 20 feet	0.001
Moderate depth ocean zone or Great Lake	Flow not applicable; depth 20 to 200 feet	0.0001
Deep ocean zone or Great Lake	Flow not applicable; depth greater than 200 feet	0.000005
3-mile mixing zone in quiet flowing river	10 cfs or greater	0.5

SI TABLE 13 (HRS TABLE 4-23): SURFACE WATER AND AIR SENSITIVE ENVIRONMENTS VALUES

SENSITIVE ENVIRONMENT	ASSIGNED VALUE
Critical habitat for Federal designated endangered or threatened species Marine Sanctuary National Park Designated Federal Wilderness Area Ecologically important areas identified under the Coastal Zone Wilderness Act Sensitive Areas identified under the National Estuary Program or Near Coastal Water Program of the Clean Water Act Critical Areas identified under the Clean Lakes Program of the Clean Water Act (subareas in lakes or entire small lakes) National Monument (air pathway only) National Seashore Recreation Area National Lakeshore Recreation Area	100
Habitat known to be used by Federal designated or proposed endangered or threatened species National Preserve National or State Wildlife Refuge Unit of Coastal Barrier Resources System Coastal Barrier (undeveloped) Federal land designated for the protection of natural ecosystems Administratively Proposed Federal Wilderness Area Spawning areas critical for the maintenance of fish/shellfish species within a river system, bay, or estuary Migratory pathways and feeding areas critical for the maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which the fish spend extended periods of time Terrestrial areas utilized by large or dense aggregations of vertebrate animals (semi-aquatic foragers) for breeding National river reach designated as recreational	75
Habitat known to be used by State designated endangered or threatened species Habitat known to be used by a species under review as to its Federal endangered or threatened status Coastal Barrier (partially developed) Federally designated Scenic or Wild River	50
State land designated for wildlife or game management State designated Scenic or Wild River State designated Natural Area Particular areas, relatively small in size, important to maintenance of unique biotic communities	25
State designated areas for the protection of maintenance of aquatic life under the Clean Water Act	5
Wetlands — See SI Table 14 (Surface Water Pathway) or SI Table 23 (Air Pathway)	

SI TABLE 14 (HRS TABLE 4-24): SURFACE WATER WETLANDS FRONTAGE VALUES

Total Length of Wetlands	Assigned Value
Less than 0.1 mile	0
0.1 to 1 mile	25
Greater than 1 to 2 miles	50
Greater than 2 to 3 miles	75
Greater than 3 to 4 miles	100
Greater than 4 to 8 miles	150
Greater than 8 to 12 miles	250
Greater than 12 to 16 miles	350
Greater than 16 to 20 miles	450
Greater than 20 miles	500

SURFACE WATER PATHWAY (concluded)
WASTE CHARACTERISTICS, THREAT, AND PATHWAY SCORE SUMMARY

WASTE CHARACTERISTICS

	Score
14. If an Actual Contamination Target (drinking water, human food chain, or environmental threat) exists for the watershed, assign the calculated hazardous waste quantity score, or a score of 100, whichever is greater.	100
15. Assign the highest value from SI Table 7 (observed release) or SI Table 3 (no observed release) for the hazardous substance waste characterization factors below. Multiply each by the surface water hazardous waste quantity score and determine the waste characteristics score for each threat.	

	Substance Value		HWQ		Product	WC Score (from Table) (Maximum of 100)
Drinking Water Threat Toxicity/Persistence	Cr 10000	x	100	=	10^6	32
Food Chain Threat Toxicity/Persistence Bioaccumulation	50,000	x	100	=	5×10^6	32
Environmental Threat Ecotoxicity/Persistence/ Ecobioaccumulation	50	x	100	=	5000	6

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 to <1E + 09	100
1E + 09 to <1E + 10	180
1E + 10 to <1E + 11	320
1E + 11 to <1E + 12	560
1E + 12 or greater	1000

SURFACE WATER PATHWAY THREAT SCORES

Threat	Likelihood of Release (LR) Score	Targets (T) Score	Pathway Waste Characteristics (WC) Score (determined above)	Threat Score $\frac{LR \times T \times WC}{82,500}$ (maximum of 100)
Drinking Water	300	5	32	0.582
Human Food Chain	300	20	32	2.327
Environmental	300	7.51	6	0.164

SURFACE WATER PATHWAY SCORE (Drinking Water Threat + Human Food Chain Threat + Environmental Threat)

(maximum of 100): 3.07

SOIL EXPOSURE PATHWAY

If there is no observed contamination (e.g., ground water plume with no known surface source), do not evaluate the soil exposure pathway. Discuss evidence for no soil exposure pathway.

Soil Exposure Resident Population Targets Summary

For each property (duplicate page 35 as necessary):

If there is an area of observed contamination on the property and within 200 feet of a residence, school, or day care center, enter on Table 15 each hazardous substance by sample ID. Record the detected concentration. Obtain cancer risk, and reference dose concentrations from SCDM. Sum the cancer risk and reference dose percentages for the substances listed. If cancer risk or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate the residents and students as Level I. If both percentages are less than 100% or all are N/A, evaluate the targets as Level II.

SI TABLE 15: SOIL EXPOSURE RESIDENT POPULATION TARGETS

Residence ID: ______________________ Level I ______ Level II ______ Population ______________________

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Highest Percent		Sum of Percents		Sum of Percents	

Residence ID: ______________________ Level I ______ Level II ______ Population ______________________

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Highest Percent		Sum of Percents		Sum of Percents	

Residence ID: ______________________ Level I ______ Level II ______ Population ______________________

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Highest Percent		Sum of Percents		Sum of Percents	

SOIL EXPOSURE PATHWAY WORKSHEET
RESIDENT POPULATION THREAT

	Score	Data Type	Refs
LIKELIHOOD OF EXPOSURE			
1. OBSERVED CONTAMINATION: If evidence indicates presence of observed contamination (depth of 2 feet or less), assign a score of 550; otherwise, assign a 0. Note that a likelihood of exposure score of 0 results in a soil exposure pathway score of 0.			
LE =	550		
TARGETS			
2. RESIDENT POPULATION: Determine the number of people occupying residences or attending school or day care on or within 200 feet of areas of observed contamination (HRS section 5.1.3). Level I: _____ people x 10 = _____ Level II: _____ people x 1 = _____ **Sum =**			
3. RESIDENT INDIVIDUAL: Assign a score of 50 if any Level I resident population exists. Assign a score of 45 if there are Level II targets but no Level I targets. If no resident population exists (*i.e.*, no Level I or Level II targets), assign 0 (HRS Section 5.1.3).	—		
4. WORKERS: Assign a score from the table below for the total number of workers at the site and nearby facilities with areas of observed contamination associated with the site.	10		
5. TERRESTRIAL SENSITIVE ENVIRONMENTS: Assign a value for each terrestrial sensitive environment (SI Table 16) in an area of observed contamination.			
Sum =	25		
6. RESOURCES: Assign a score of 5 if any one or more of the following resources is present on an area of observed contamination at the site; assign 0 if none applies. • Commercial agriculture • Commercial silviculture • Commercial livestock production or commercial livestock grazing			
Total of Targets T=	85		

Number of Workers	Score
0	0
1 to 100	5
101 to 1,000	10
>1,000	15

Terrestrial Sensitive Environment Type	Value
Fed. E Vanguard (Range ONLY)	25

SI TABLE 16 (HRS TABLE 5-5): SOIL EXPOSURE PATHWAY TERRESTRIAL SENSITIVE ENVIRONMENT VALUES

TERRESTRIAL SENSITIVE ENVIRONMENT	*ASSIGNED VALUE*
Terrestrial critical habitat for Federal designated endangered or threatened species National Park Designated Federal Wilderness Area National Monument	100
Terrestrial habitat known to be used by Federal designated or proposed threatened or endangered species National Preserve (terrestrial) National or State terrestrial Wildlife Refuge Federal land designated for protection of natural ecosystems Administratively proposed Federal Wilderness Area Terrestrial areas utilized by large or dense aggregations of animals (vertebrate species) for breeding	75
Terrestrial habitat used by State designated endangered or threatened species Terrestrial habitat used by species under review for Federal designated endangered or threatened status	50
State lands designated for wildlife or game management State designated Natural Areas Particular areas, relatively small in size, important to maintenance of unique biotic communities	25

SOIL EXPOSURE PATHWAY WORKSHEET
NEARBY POPULATION THREAT

LIKELIHOOD OF EXPOSURE	Score	Data Type	Ref.
7. Attractiveness/Accessibility (from SI Table 17 or HRS Table 5-6) Value _____ Area of Contamination (from SI Table 18 or HRS Table 5-7) Value _____ Likelihood of Exposure (from SI Table 19 or HRS Table 5-8)			
LE =	0		

TARGETS	Score	Data Type	Ref.
8. Assign a score of 0 if Level I or Level II resident individual has been evaluated or if no individuals live within 1/4 mile travel distance of an area of observed contamination. Assign a score of 1 if nearby population is within 1/4 mile travel distance and no Level I or Level II resident population has been evaluated.	0		
9. Determine the population within 1 mile travel distance that is not exposed to a hazardous substance from the site (*i.e.*, properties that are not determined to be Level I or Level II); record the population for each distance category in SI Table 20 (HRS Table 5-10). Sum the population values and multiply by 0.1.			
T =	0		

SI TABLE 17 (HRS TABLE 5-6): ATTRACTIVENESS/ACCESSIBILITY VALUES

Area of Observed Contamination	Assigned Value
Designated recreational area	100
Regularly used for public recreation (for example, vacant lots in urban area)	75
Accessible and unique recreational area (for example, vacant lots in urban area)	75
Moderately accessible (may have some access improvements–for example, gravel road) with some public recreation use	50
Slightly accessible (for example, extremely rural area with no road improvement) with some public recreation use	25
Accessible with no public recreation use	10
Surrounded by maintained fence or combination of maintained fence and natural barriers	5
Physically inaccessible to public, with no evidence of public recreation use	0

SI TABLE 18 (HRS TABLE 5-7): AREA OF CONTAMINATION FACTOR VALUES

Total area of the areas of observed contamination (square feet)	Assigned Value
≤ to 5,000	5
> 5,000 to 125,000	20
> 125,000 to 250,000	40
> 250,000 to 375,000	60
> 375,000 to 500,000	80
> 500,000	100

SI TABLE 19 (HRS TABLE 5-8): NEARBY POPULATION LIKELIHOOD OF EXPOSURE FACTOR VALUES

AREA OF CONTAMINATION FACTOR VALUE	ATTRACTIVENESS/ACCESSIBILITY FACTOR VALUE						
	100	75	50	25	10	5	0
100	500	500	375	250	125	50	0
80	500	375	250	125	50	25	0
60	375	250	125	50	25	5	0
40	250	125	50	25	5	5	0
20	125	50	25	5	5	5	0
5	50	25	5	5	5	5	0

SI TABLE 20 (HRS TABLE 5-10): DISTANCE-WEIGHTED POPULATION VALUES FOR NEARBY POPULATION THREAT

Travel Distance Category (miles)	Pop.	Number of people within the travel distance category												Pop. Value
		0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,001	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	
Greater than 0 to $\frac{1}{4}$		0	0.1	0.4	1.0	4	13	41	130	408	1,303	4,081	13,034	
Greater than $\frac{1}{4}$ to $\frac{1}{2}$		0	0.05	0.2	0.7	2	7	20	65	204	652	2,041	6,517	
Greater than $\frac{1}{2}$ to 1		0	0.02	0.1	0.3	1	3	10	33	102	326	1,020	3,258	
													Sum =	

Reference(s) _____

SOIL EXPOSURE PATHWAY WORKSHEET (concluded)

WASTE CHARACTERISTICS

10.	Assign the hazardous waste quantity score calculated for soil exposure	
11.	Assign the highest toxicity value from SI Table 16	
12.	Multiply the toxicity and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below:	WC = 32

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 or greater	100

RESIDENT POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 1;
Targets = Sum of Questions 2, 3, 4, 5, 6)

$$\frac{LE \times T \times WC}{82,500}$$

18.13

NEARBY POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 7;
Targets = Sum of Questions 8, 9)

$$\frac{LE \times T \times WC}{82,500}$$

0

SOIL EXPOSURE PATHWAY SCORE:
Resident Population Threat + Nearby Population Threat

18,13
(Maximum of 100)

SITE SCORE CALCULATION	S	S^2
GROUND WATER PATHWAY SCORE (S_{GW})	8.48	71.91
SURFACE WATER PATHWAY SCORE (S_{SW})	3.07	9.42
SOIL EXPOSURE (S_S)	18.13	328.82
AIR PATHWAY SCORE (S_A)	0	0
SITE SCORE $\sqrt{\frac{S_{GW}^2+S_{SW}^2+S_S^2+S_A^2}{4}}$ = $\sqrt{\frac{410.15}{4}}$		10.13

COMMENTS

OVERSIZED

DOCUMENT